

Please type a plus sign (+) inside this box → ☐

PTO/SB/05 (12/97) (modified)
Approved for use through 09/30/00. OMB 0651-0032
Patent and Trademark Office U.S. DEPARTMENT OF COMMERCE

**UTILITY
PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. GE0C.P0003D1

First Named Inventor: Shimomura, et al.

Title: A Broadband Data Broadcasting Service

Express Mail Label No. EL552915793US

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

Express Mail Label No.: EL552915793US

Date of Deposit: February 28, 2000

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Dag Johansen

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☐ Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)
2. ☒ Specification -- Total Pages --
Including:
 - Title page
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. ☒ Drawing(s) (35 USC 113) -- Total Sheets --
4. ☒ Oath or Declaration) -- Total Pages --
 - a. ☐ Newly executed (original or copy)
 - b. ☒ Copy from a prior application (37 CFR 1.63(d)
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]
 - i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in
the prior application, see 37 CFR 1.63(d)(2) and 1.33(b)
5. ☒ Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the
oath or declaration is supplied under Box 4b, is considered as being
part of the disclosure of the accompanying application and is hereby
incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. ☐ Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
 - a. ☐ Computer Readable Copy
 - b. ☐ Paper Copy (identical to computer copy)
 - c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

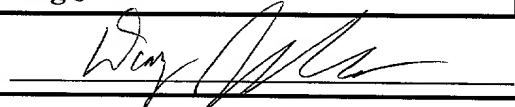
8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure
Statement (IDS)/PTO-1449 ☐ Copies of IDS
Citations
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
14. ☐ Small Entity ☐ Statement filed in prior application,
Statement(s) Status still proper and desired
15. ☐ Certified Copy of Priority
Document(s) (if foreign priority is
claimed)
16. ☐

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

* ☐ Continuation ☒ Divisional ☐ Continuation-in-part (CIP) of prior application No: 09/293,594

18. CORRESPONDENCE ADDRESS

Dag Johansen, Esq.
GEOCAST NETWORK SYSTEMS, INC.
190 Independence Drive
Menlo Park, California 94025
Telephone: (650) 566.3214
Facsimile: (650) 8112

Name	Dag Johansen	Registration Number:	36,172
Signature		Date:	February 28, 2000

Serial/Patent No.: 09/293,594 Filing/Issue Date: 4/16/99
Client: GEOCAST NETWORK SYSTEMS, INC.
Title: A Broadband Data Broadcasting Service

BSTZ File No.: 00167.P003 Atty/Secty Initials: DHJ/gre
Date Mailed: 7/6/99 Docket Due Date: _____

The following has been received in the U.S. Patent & Trademark Office on the date stamped hereon:

- | | | |
|--|--|--|
| <input type="checkbox"/> Amendment/Response (____ pgs.) | <input type="checkbox"/> Express Mail No.: _____ | <input checked="" type="checkbox"/> Check No. <u>617</u> |
| <input type="checkbox"/> Appeal Brief (____ pgs.) (in triplicate) | <input type="checkbox"/> _____ Month(s) Extension of Time | Amt: <u>40.00</u> |
| <input type="checkbox"/> Application - Utility (____ pgs., with cover and abstract) | <input type="checkbox"/> Information Disclosure Statement & PTO 149 (____ pgs.) | <input type="checkbox"/> Check No. _____ |
| <input type="checkbox"/> Application - Rule 1.53(b) Continuation (____ pgs.) | <input type="checkbox"/> Issue Fee Transmittal | Amt: _____ |
| <input type="checkbox"/> Application - Rule 1.53(b) Divisional (____ pgs.) | <input type="checkbox"/> Notice of Appeal | |
| <input type="checkbox"/> Application - Rule 1.53(b) CIP (____ pgs.) | <input type="checkbox"/> Petition for Extension of Time | |
| <input type="checkbox"/> Application - Rule 1.53(d) CPA Transmittal (____ pgs.) | <input type="checkbox"/> Petition for _____ | |
| <input type="checkbox"/> Application - Design (____ pgs.) | <input checked="" type="checkbox"/> Postcard | |
| <input type="checkbox"/> Application - PCT (____ pgs.) | <input type="checkbox"/> Power of Attorney (____ pgs.) | |
| <input type="checkbox"/> Application - Provisional (____ pgs.) | <input type="checkbox"/> Preliminary Amendment (____ pgs.) | |
| <input checked="" type="checkbox"/> Assignment and Cover Sheet (<i>Assignments 3 pgs</i>) | <input type="checkbox"/> Reply Brief (____ pgs.) | |
| <input type="checkbox"/> Certificate of Mailing | <input type="checkbox"/> Response to Notice of Missing Parts | |
| <input type="checkbox"/> Declaration & POA (____ pgs.) | <input type="checkbox"/> Small Entity Declaration for Indep. Inventor/Small Business | |
| <input type="checkbox"/> Disclosure Docs & Orig & Copy of Invention Signed Later (____ pgs.) | <input type="checkbox"/> Transmittal Letter, in duplicate | |
| <input type="checkbox"/> Drawings: _____ # of sheets includes _____ figures | <input type="checkbox"/> Fee Transmittal, in duplicate | |

☐ Other: _____

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on February 28, 2000 with Express Mail label number EL552915793US and is addressed to the Assistant Commissioner of Patents and Trademarks, Washington, D.C. 20231.


Dag Johansen

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Shimomura, et al.

Serial No.: <not yet assigned>

Filing Date: February 28, 2000

For: **A Broadband Data Broadcasting Service**

Examiner: <not yet assigned>

Group Art Unit: <not yet assigned>

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

The Applicants received a restriction requirement dated January 1, 2000 for the parent application. In a response to the restriction requirement, the Applicants elected claim Group I. The above-identified divisional patent application has been filed to obtain protection for some of the nonelected claims. This preliminary amendment for a divisional application also includes additional claims to further protect the disclosed inventions. Please amend the divisional patent applications as follows.

IN THE TITLE:

Please change the title of the application from “A Broadband Data Broadcasting Service” to --Methods of Operating A Data Broadcast Service--.

IN THE SPECIFICATION:

On page 2, line 2, please insert the following paragraph --

PRIOR APPLICATIONS:

This patent application is a continuation of the patent application entitled “A Broadband Data Broadcasting Service” filed on 4/16/99 having serial number 09/293,594. --

On page 14, line 14, please replace “557” with --257-- in order to have the specification conform to the drawing.

On page 15, line 13, please replace “receive” with --receiver--.

On page 22, line 1, please replace “**Data Broadcast Receiver/Server Hardware**” with -- **Data Broadcast Receiver/Server Software**-- in order to have the section title conform to the section text.

IN THE CLAIMS:

Please amend the claims as follows:

Please delete claims 1 to 11

1 12. (Amended) A method of generating revenue, said method
2 comprising:
3 distributing a plurality of data broadcast receiver systems, said data broadcast
4 receiver systems comprising
5 receiver circuitry for demodulating and decoding an encoded digital
6 information signal,
7 a cache for storing multimedia information from said encoded digital
8 information signal, and
9 interface circuitry for coupling a receiver system to a client system to
10 output said multimedia information to said client system;
11 receiving a broadcast and retention fee from an entity desiring to distribute
12 designated digital information; [and]
13 broadcasting said designated digital information to said plurality of data broadcast
14 receiver systems; and
15 caching said designated digital information in said cache on said data broadcast
16 receiver systems such that client systems coupled to said data broadcast
17 receiver systems may retrieve said designated digital information.

1 13. The method of claim 12 wherein said entity pays a fee related to an
2 amount of time that said designated digital information will be cached in said broadcast
3 receiver systems.

1 14. The method of claim 12 wherein said entity pays a fee related to an
2 amount of said designated digital information.

Please delete claims 15 to 21.

Please add the following claims

1 22. (Added) The method of claim 12 wherein said entity pays a fee
2 related to an amount of time that said designated digital information will be cached in
3 said broadcast receiver systems.

1 23. (Added) The method of claim 12 wherein said designated digital
2 information comprises a catalog.

1 24. (Added) The method of claim 23 wherein a user may browse said
2 catalog.

1 25. (Added) The method of claim 23 wherein a user may elect to
2 purchase an item from said catalog using said client system.

1 26. (Added) The method of claim 25 wherein information about said
2 item from said catalog to be purchased is transmitted across an Internet connection.

1 27. (Added) The method of claim 25 wherein information about said
2 item from said catalog to be purchased is transmitted across a wireless connection.

1 28. (Added) The method of claim 25 wherein said wireless connection
2 comprises the Short Message Service.

1 29. (Added) The method of generating revenue as claimed in claim 12
2 wherein said method further comprises:
3 streaming real-time information received on said data broadcast receiver system
4 to said client system.

1 30. (Added) The method of claim 12 wherein said client system
2 comprises a personal computer system.

1 31. (Added) A method of generating revenue, said method comprising:
2 distributing a plurality of data broadcast receiver systems, said data broadcast
3 receiver systems comprising
4 receiver circuitry for demodulating and decoding an encoded digital
5 information signal,
6 a cache for storing multimedia information recovered from said encoded
7 digital information signal; and
8 receiving a broadcast and retention fee from an entity desiring to distribute
9 designated digital information;
10 broadcasting said designated digital information to said plurality of data broadcast
11 receiver systems; and
12 caching said designated digital information in said cache on said data broadcast
13 receiver systems.

1 32. (Added) The method of claim 31 wherein said entity pays a fee
2 related to an amount of time that said designated digital information will be cached in
3 said broadcast receiver systems.

1 33. (Added) The method of claim 31 wherein said entity pays a fee
2 related to an amount of said designated digital information.

1 34. (Added) The method of claim 31 wherein said fee related is to an
2 amount of time that said designated digital information will be cached in said broadcast
3 receiver systems.

1 35. (Added) The method of claim 31 wherein said designated digital
2 information comprises a catalog.

1 36. (Added) The method of generating revenue as claimed in claim 12
2 wherein said data broadcast receiver system further comprises:
3 interface circuitry for coupling a receiver system to a client system to
4 output said multimedia information to said client system.

1 37. (Added) The method of claim 36 wherein said client system
2 comprises a personal computer system.

1 38. (Added) A method of generating revenue, said method comprising:
2 distributing a plurality of data broadcast receiver systems, said data broadcast
3 receiver systems comprising

4 receiver circuitry for demodulating and decoding an encoded digital
5 information signal,
6 a cache for storing multimedia information recovered from said encoded
7 digital information signal; and
8 receiving an advertising fee from an entity desiring to distribute designated digital
9 advertisements;
10 broadcasting said designated digital information to said plurality of data broadcast
11 receiver systems; and
12 displaying said advertisements on a display system used by a user of said data
13 broadcast receiver systems.

1 39. (Added) The method of generating revenue as claimed in claim 38
2 wherein said data broadcast receiver system further comprises:
3 interface circuitry for coupling a receiver system to a client system to
4 output said multimedia information to said client system.

1 40. (Added) The method of claim 39 wherein said client system
2 comprises a personal computer system and said display system comprises a personal
3 computer display associated with said personal computer system.

1 41. (Added) The method of generating revenue as claimed in claim 38
2 further comprising:
3 encrypting a subset of said encoded digital information signal;
4 decrypting said subset of said encoded digital information signal only within data
5 broadcast receiver systems own by a user that has paid a designated
6 subscription fee.

1 42. (Added) The method of claim 41 wherein said decrypting is
2 performed using a tamper-proof decryption system.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055
1056
1057
1058
1059
1060
1061
1062
1063
1064
1065
1066
1067
1068
1069
1070
1071
1072
1073
1074
1075
1076
1077
1078
1079
1080
1081
1082
1083
1084
1085
1086
1087
1088
1089
1090
1091
1092
1093
1094
1095
1096
1097
1098
1099
1100
1101
1102
1103
1104
1105
1106
1107
1108
1109
1110
1111
1112
1113
1114
1115
1116
1117
1118
1119
1120
1121
1122
1123
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134
1135
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
1148
1149
1150
1151
1152
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
1180
1181
1182
1183
1184
1185
1186
1187
1188
1189
1190
1191
1192
1193
1194
1195
1196
1197
1198
1199
1200
1201
1202
1203
1204
1205
1206
1207
1208
1209
1210
1211
1212
1213
1214
1215
1216
1217
1218
1219
1220
1221
1222
1223
1224
1225
1226
1227
1228
1229
1230
1231
1232
1233
1234
1235
1236
1237
1238
1239
1240
1241
1242
1243
1244
1245
1246
1247
1248
1249
1250
1251
1252
1253
1254
1255
1256
1257
1258
1259
1260
1261
1262
1263
1264
1265
1266
1267
1268
1269
1270
1271
1272
1273
1274
1275
1276
1277
1278
1279
1280
1281
1282
1283
1284
1285
1286
1287
1288
1289
1290
1291
1292
1293
1294
1295
1296
1297
1298
1299
1300
1301
1302
1303
1304
1305
1306
1307
1308
1309
1310
1311
1312
1313
1314
1315
1316
1317
1318
1319
1320
1321
1322
1323
1324
1325
1326
1327
1328
1329
1330
1331
1332
1333
1334
1335
1336
1337
1338
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352
1353
1354
1355
1356
1357
1358
1359
1360
1361
1362
1363
1364
1365
1366
1367
1368
1369
1370
1371
1372
1373
1374
1375
1376
1377
1378
1379
1380
1381
1382
1383
1384
1385
1386
1387
1388
1389
1390
1391
1392
1393
1394
1395
1396
1397
1398
1399
1400
1401
1402
1403
1404
1405
1406
1407
1408
1409
1410
1411
1412
1413
1414
1415
1416
1417
1418
1419
1420
1421
1422
1423
1424
1425
1426
1427
1428
1429
1430
1431
1432
1433
1434
1435
1436
1437
1438
1439
1440
1441
1442
1443
1444
1445
1446
1447
1448
1449
1450
1451
1452
1453
1454
1455
1456
1457
1458
1459
1460
1461
1462
1463
1464
1465
1466
1467
1468
1469
1470
1471
1472
1473
1474
1475
1476
1477
1478
1479
1480
1481
1482
1483
1484
1485
1486
1487
1488
1489
1490
1491
1492
1493
1494
1495
1496
1497
1498
1499
1500
1501
1502
1503
1504
1505
1506
1507
1508
1509
1510
1511
1512
1513
1514
1515
1516
1517
1518
1519
1520
1521
1522
1523
1524
1525
1526
1527
1528
1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
1545
1546
1547
1548
1549
1550
1551
1552
1553
1554
1555
1556
1557
1558
1559
1560
1561
1562
1563
1564
1565
1566
1567
1568
1569
1570
1571
1572
1573
1574
1575
1576
1577
1578
1579
1580
1581
1582
1583
1584
1585
1586
1587
1588
1589
1590
1591
1592
1593
1594
1595
1596
1597
1598
1599
1600
1601
1602
1603
1604
1605
1606
1607
1608
1609
1610
1611
1612
1613
1614
1615
1616
1617
1618
1619
1620
1621
1622
1623
1624
1625
1626
1627
1628
1629
1630
1631
1632
1633
1634
1635
1636
1637
1638
1639
1640
1641
1642
1643
1644
1645
1646
1647
1648
1649
1650
1651
1652
1653
1654
1655
1656
1657
1658
1659
1660
1661
1662
1663
1664
1665
1666
1667
1668
1669
1670
1671
1672
1673
1674
1675
1676
1677
1678
1679
1680
1681
1682
1683
1684
1685
1686
1687
1688
1689
1690
1691
1692
1693
1694
1695
1696
1697
1698
1699
1700
1701
1702
1703
1704
1705
1706
1707
1708
1709
1710
1711
1712
1713
1714
1715
1716
1717
1718
1719
1720
1721
1722
1723
1724
1725
1726
1727
1728
1729
1730
1731
1732
1733
1734
1735
1736
1737
1738
1739
1740
1741
1742
1743
1744
1745
1746
1747
1748
1749
1750
1751
1752
1753
1754
1755
1756
1757
1758
1759
1760
1761
1762
1763
1764
1765
1766
1767
1768
1769
1770
1771
1772
1773
1774
1775
1776
1777
1778
1779
1780
1781
1782
1783
1784
1785
1786
1787
1788
1789
1790
1791
1792
1793
1794
1795
1796
1797
1798
1799
1800
1801
1802
1803
1804
1805
1806
1807
1808
1809
1810
1811
1812
1813
1814
1815
1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
1826
1827
1828
1829
1830
1831
1832
1833
1834
1835
1836
1837
1838
1839
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055
2056
2057
2058
2059
2060
2061
2062
2063
2064
2065
2066
2067
2068
2069
2070
2071
2072
2073
2074
2075
2076
2077
2078
2079
2080
2081
2082
2083
2084
2085
2086
2087
2088
2089
2090
2091
2092
2093
2094
2095
2096
2097
2098
2099
2100
2101
2102
2103
2104
2105
2106
2107
2108
2109
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119
2120
2121
2122
2123
2124
2125
2126
2127
2128
2129
2130
2131
2132
2133
2134
2135
2136
2137
2138
2139
2140
2141
2142
2143
2144
2145
2146
2147
2148
2149
2150
2151
2152
2153
2154
2155
2156
2157
2158
2159
2160
2161
2162
2163
2164
2165
2166
2167
2168
2169
2170
2171
2172
2173
2174
2175
2176
2177
2178
2179
2180
2181
2182
2183
2184
2185
2186
2187
2188
2189
2190
2191
2192
2193
2194
2195
2196
2197
2198
2199
2200
2201
2202
2203
2204
2205
2206
2207
2208
2209
2210
2211
2212

REMARKS

The Applicants respectfully request that the Examiner enter the above preliminary amendment before considering the divisional patent application. The amendments and additions to the claims have been made to better protect the disclosed invention.

Dated: February 28, 2000

Respectfully submitted,

By: 
Dag Johansen
Registration No. 36,172

Geocast Network Systems, Inc.
190 Independence Drive
Menlo Park, California 94025
Telephone: (650) 566-3214
Facsimile: (650) 566-8112

APPLICATION FOR UNITED STATES LETTERS PATENT

FOR

A Broadband Data Broadcasting Service

Inventors: Tsutomu Shimomura
Steve Waltman
Mark Peting
Castor Fu
Dag Johansen
Geoff Mulligan

Prepared by:

Dag Johansen
100 Independence Drive
Menlo Park, CA 94025

"Express Mail" mailing label number EL164803498US

Date of Deposit 4/16/99

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Grace R. Cruz

(Typed or printed name of person mailing paper or fee)

(Signature of person mailing papers or fee)

A Broadband Data Broadcasting Service

RELATED APPLICATIONS

5 This patent application is related to a patent application entitled
"Method and Apparatus for Broadcasting Data With Access Control" having
Serial Number _____, filed concurrently with this application.

FIELD OF THE INVENTION

10 The present invention relates to the field of digital communications.
In particular the present invention discloses a broadband digital broadcast
system for broadcasting digital information to a very large number of
subscribers.

15 BACKGROUND OF THE INVENTION

 The Internet has become a major source of news and information
for very large numbers of people. In particular, millions of Internet users browse
20 the World Wide Web (WWW) to obtain HyperText Markup Language (HTML)
documents using the HyperText Transport Protocol (HTTP). Many people now
receive more news and information from the Internet WWW sites than from
traditional information sources such as television. The WWW portion of the
Internet is an excellent medium for news and information since the WWW
25 Internet sites can provide information to users on-demand. Specifically, Internet

users can immediately request the exact information they are interested in when ever they wish from WWW Internet sites.

However, the Internet WWW system news information does suffer
5 from a number of deficiencies. One serious problem is that the limited
bandwidth of most Internet connections severely limits the amount of
information delivered. Most Internet users access the Internet through a dial-up
modem at speeds of 56kps per second or less. With such limited bandwidth,
most Internet based WWW sites only deliver text and static images. When video
10 information delivered through 56K Internet connections the video information is
compressed so heavily such that only small low-resolution video images are
delivered at a low frame rate.

To improve upon the performance of the Internet, many
15 telecommunication providers are now offering high-bandwidth connections for
the "last mile" to an Internet user's residence. Cable television providers are
now offering cable modem Internet service that use cable television wiring to
deliver broadband Internet service. Similarly, telephone companies are rolling
out Digital Subscriber Line (DSL) services that provide broadband Internet
20 service. Although these broadband data connections provide additional
bandwidth, such broadband connections only address the "last mile" bandwidth
problem associated with sending rich multi-media information across the
Internet. Many other problems will continue to exist.

One problem of delivering rich multi-media information across the Internet is that there are no standard quality-of-service guarantees for Internet Protocol data traffic. All Internet Protocol traffic is delivered on a best effort basis such that Internet Protocol packets are often dropped. Due the rapid
5 uncontrolled growth of the Internet, many severe Internet "traffic jams" have occurred at large Internet peering point such as MAE-East and MAE-west. Thus, even if a user has a broadband connection between his residence and his Internet Service Provider (ISP), there is no guarantee that the connection between the Internet Service Provider (ISP) and a desired Internet media server will provide
10 the bandwidth necessary for a rich multimedia stream.

Another problem with attempting to deliver rich multi-media information across the Internet is the point-to-point nature of Internet communication. Most Internet communication occurs in a unicast manner
15 wherein a unique communication connection is established between each information server and each Internet client. Since each Internet client requires its own connection, the bandwidth requirement for serving information grows linearly with the number of Internet clients being served. Furthermore, each Internet client that requests service adds additional load to the server systems
20 that service information. To serve rich multimedia information to a large number of a client systems, a large powerful server farm is required. It is therefore quite expensive from the server end in both communication costs and computer costs to serve large amounts of rich multi-media information.

- Due to the above-described problems associated with Internet delivery of multimedia information, the Internet will largely remain a text and static image based information source. It would be desirable to provide a multimedia rich information system that is similar to the Internet in terms of on-
- 5 demand access of interesting information but without the bandwidth problems associated with the Internet network system.

100% of the total population of the United States is now using the Internet. This is a significant increase from the 1990s when only a small fraction of the population was online. The growth of the Internet has been rapid and continues to accelerate. This has led to a corresponding increase in the demand for bandwidth and network capacity. The current system of the Internet is not designed to handle the massive amount of data being transmitted, leading to congestion and delays. This is a major problem for the delivery of multimedia information, which requires high bandwidth and low latency. The current system is also not designed to handle the increasing number of users and devices connected to the network. This is a significant challenge for the future of the Internet, as the demand for bandwidth and network capacity continues to grow. The current system is not designed to handle the massive amount of data being transmitted, leading to congestion and delays. This is a major problem for the delivery of multimedia information, which requires high bandwidth and low latency. The current system is also not designed to handle the increasing number of users and devices connected to the network. This is a significant challenge for the future of the Internet, as the demand for bandwidth and network capacity continues to grow.

SUMMARY OF THE INVENTION

The present invention discloses a broadband data broadcast system that allows rich multimedia content to be delivered to the computer and
5 information appliance systems of limitless numbers of subscribers. The broadband data broadcast system operates by multiplexing a plurality of multimedia rich digital information streams together at a centralized data broadcast center. The data broadcast center then broadcasts the multiplexed digital information stream on a broadcast medium such as satellite broadcasts,
10 radio frequency broadcasts, or television broadcasts. A large number of receiver systems receive the broadcast signal and demodulate the broadcast signal to retrieve the multiplexed digital stream. The receiver system extracts a subset of digital information streams that the particular receiver system's owner has designated are of interest. The receiver system then output the interesting digital
15 information streams to a display system or caches the interesting digital information stream for later access.

Other objects, features, and advantages of present invention will be apparent from the company drawings and from the following detailed
20 description.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects, features, and advantages of the present invention will be apparent to one skilled in the art, in view of the following detailed description
5 in which:

Figure 1 illustrates an overview of a terrestrial data broadcast system.

10 **Figure 2a** illustrates an overview of a multiple broadcaster based terrestrial data broadcast system.

Figure 2b illustrates a block diagram of a multiple broadcaster based terrestrial data broadcast system.

15 **Figure 3a** illustrates a multimedia receiver/server system coupled to a personal computer system.

Figure 3b illustrates a multimedia receiver/server system coupled
20 to a television set-top box system.

Figure 3c illustrates a multimedia receiver/server system coupled to a personal computer system that is also coupled to the Internet.

Figure 3d illustrates a multimedia receiver/server system coupled to a television set-top box system that is also coupled to the Internet. --

Figure 4 illustrates an embodiment of a multimedia receiver/server system coupled to a computer network such that the multimedia receiver/server system serves multiple client systems.

Figure 5 illustrates an embodiment of a multimedia receiver/server system that receives a data broadcast from a direct video broadcast satellite.

10

Figure 6a illustrates an embodiment of a multimedia receiver/server system that receives a data broadcast on a digital television broadcaster signal.

15

Figure 6b illustrates a block diagram of a multimedia receiver/server system that receives data broadcasts from multiple digital television broadcasters.

Figure 7 illustrates a conceptual flow diagram of one possible software architecture for a multimedia receiver/server system.

20

Figure 8 illustrates a first possible screen display from a multimedia web page served by a multimedia receiver/server system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A method and apparatus for a directed data broadcast system is disclosed. In the following description, for purposes of explanation, specific
5 nomenclature is set forth to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that these specific details are not required in order to practice the present invention. For example, the present invention has been described with reference to Internet multicasting. However, the same techniques can easily be applied to other types
10 of data communication protocols.

Overview of A Data Broadcast System

Figure 1 illustrates an overview of one embodiment of a data
15 broadcast system that may incorporate the teachings of the present invention. Referring to **Figure 1**, a data broadcast control center **150** receives digital information from a number of different data origination sources **110**, **113**, and **115**.

20 For example, a first data origination source **110** transmits a digital information stream to a data broadcast facility **150** along a data communication channel **130**. The data origination source **110** may be any entity that provides digital information for broadcast data over a data broadcast medium. One type
25 of entity that may provide digital information for broadcast data over a data broadcast medium may be a broadcast news studio that creates audio and/or

video news segments. The audio and/or video news segments may be digitized before or after transmission to the broadcast facility 150

The broadcast control center 150 processes the incoming digital
5 information stream from data origination source 110 by adding addressing information, stream descriptor information, and error correction coding. Other stream processing operations may be performed such as encryption of the information streams. The broadcast control center 150 then multiplexes the received digital information stream from data origination source 110 with digital
10 information streams from other sources such as data origination source 113 and data origination source 115.

After processing the individual digital information streams and multiplexing the individual digital information streams into a single broadcast
15 stream, the broadcast facility 150 then modulates the multiplexed digital information stream onto a digital broadcast signal. The broadcast control center 150 then transmits the digital broadcast signal on a broadcast distribution medium. In the particular embodiment illustrated in **Figure 1**, a terrestrial wireless broadcast system is used to broadcast the digital broadcast signal to a
20 large number of receiving sites. However, it should be noted that many types of broadcast media can be used such as digital broadcast television signals, cable television signals, radio frequency broadcasts, direct video broadcast satellite signals, or any other suitable broadcast medium.

At each data broadcast receiver site is a data broadcast receiver system such as receiver 181 constructed to receive the digital broadcast signal. The receiver system 181 demodulates the digital broadcast signal to retrieve the multiplexed digital information stream. The receiver system 181 then examines the address portion of data packets and/or stream descriptor portions of each digital information stream to determine if the receiver system 181 is interested in a particular digital information stream. The receiver system 181 may be interested in a particular digital information stream if that digital information stream matches a set of preprogrammed interest parameters as defined by the receiver systems owner. The receiver system 181 may cache the matching digital information streams and/or directly output the matching digital information streams to one or more local client systems at the receiver system's site.

In one embodiment, the receiver system may distribute the output digital information streams in multicast Internet Protocol (IP) form on a local area network (LAN) if requested by any multicast subscribers on the LAN. For example, receiver system 184 receives and decodes the multiplexed broadcast signal. The receiver system 184 then rebroadcasts a subset of the received data onto an internal local area network (LAN) 130 such that the information stream is made available to client systems 131, 132, and 133. Furthermore, the receiver system 184 may cache the received digital information internally such that the information may be retrieved by the client systems at a later time.

Terrestrial Digital Television Data Broadcast Distribution

One broadcast medium that may be used to broadcast digital information is the terrestrial digital television infrastructure that is currently being built out. In a terrestrial digital television based transmission system, the processed multiplexed information stream is broadcast on a digital television transmission system using the MPEG-2 transport protocol.

The cost of building and maintaining a terrestrial digital television transmission system is very high. It would therefore be very expensive to build a terrestrial digital television transmission system just for data broadcasting. Instead, it would be desirable to share terrestrial digital television broadcast transmission capability with a terrestrial digital television broadcaster. Thus, the present invention introduces an embodiment that uses extra broadcast capacity on terrestrial digital television transmission systems to provide an inexpensive data broadcast transmission system. In a preferred embodiment, extra digital broadcast transmission capacity from more than one digital television broadcaster may be used to provide broadband data broadcasting.

Figure 2a illustrates a data broadcasting embodiment wherein the data broadcast control center **150** delivers MPEG-2 transport protocol encoded information streams to one or more terrestrial digital television broadcast centers **251, 252, and 253**. The terrestrial digital television broadcast centers (**251, 252, and 253**) merge the received MPEG-2 transport protocol encoded information streams into their ATSC (Advanced Television Standards Committee) digital television signals. The terrestrial digital television broadcast centers **251, 252,**

and 253 then broadcast the merged signal to all the receiver systems through their digital television transmission systems 261, 262, and 263. The receiver systems (181, 182, 183 . . .) receive the ATSC digital television signals and extract the desired digital information streams from the MPEG-2 transport stream. In such a multi-broadcaster embodiment, each receiver system (181, 182, 183 . . .) should have more than one receiver circuit such that multiple digital television broadcast centers (251, 252, and 253) can be monitored simultaneously.

Figure 2 illustrates a block diagram of the embodiment in **Figure 1**.

As illustrated in the block diagram of **Figure 2**, a multiplexing unit 257 must multiplex all of the processed digital information streams into a number of outgoing digital information streams equal to the number of broadcast stations being used. For example, in the example embodiment of **Figures 2a** and **2b**, the multiplexing unit 557 must distribute the outgoing digital information stream to the three digital television broadcast stations 251, 252, and 253.

The individual digital television broadcast stations 251, 252, and 253 multiplex the data broadcast information in with their local digital television signal. The individual digital television broadcast stations 251, 252, and 253 may also multiplex in additional locally generated data broadcast content. For example, digital television broadcast stations 251 may create additional data broadcast formatted content with local advertisers and local news teams. These local content digital information streams provide additional data broadcast content to the data broadcast digital information streams. All of the receiver

systems (181, 182, 183 . . .) will receive the data broadcast signals from all the participating television broadcaster stations (251, 252, and 253).

Additional detailed information on a data broadcasting infrastructure that can use the teachings of the present invention is available in the co-pending patent application entitled "Method and Apparatus for Broadcasting Data With Access Control" having Serial Number _____, filed concurrently with this patent application and hereby incorporated by reference.

Data Broadcast Receiver Systems

The receiver systems of the present invention receive data broadcast information and present that information to users of the receive system. In one embodiment, the data broadcast receiver systems receive the data broadcast streams and present that information to other client systems that display the received digital information. Such an embodiment is referred to as a wireless multimedia receiver/server device since multimedia information is received over a wireless medium and served to other client systems.

Figure 3a illustrates a first example usage of a wireless multimedia receiver/server device. In the embodiment of **Figure 3a**, a personal computer system **310** is coupled directly to a wireless multimedia receiver/server device **330**. A number of different interface ports on computer system **310** may be used for such a connection. For example, a parallel data port, a Small Computer System Interface (SCSI), an Ethernet interface (using a cross-over cable), a

FireWire™ Bus (IEEE.1394), or a Universal Serial Bus (USB) interface may be used to couple computer system 310 to wireless multimedia receiver/server device 330. It is desirable to select the available computer interface having the highest data rate in order to efficiently deliver rich multimedia content from the multimedia receiver/server device 330 to the computer system 310.

The wireless multimedia receiver/server device is not limited to usage by personal computer systems. **Figure 3b** illustrates an example usage wherein a television set-top box 320 is coupled to a wireless multimedia receiver/server device 330. The television set-top box 320 may operate using standard Internet data communication protocols such as HyperText Transport Protocol (HTTP).

The wireless multimedia receiver/server device 330 may be used alone as illustrated in **Figures 3a** and **3b** or in conjunction with a wired network connection. **Figures 3c** and **3d** illustrate an application of a wireless multimedia receiver/server device 330 wherein the wireless multimedia receiver/server device 330 acts as an intermediary for an Internet connection. In such an embodiment, the wireless multimedia receiver/server device 330 may act as a proxy server for the Internet. In such an arrangement, the wireless multimedia receiver/server device 330 may provide many additional services such as local domain name service (DNS), web page caching, and email service. In a web page caching wireless multimedia receiver/server device 330, the broadcast control center may broadcast versions of very popular web pages to the wireless

multimedia receiver/server devices such that very popular web pages are immediately available.

The receiver systems can be used to provide service to multiple client systems at a receiver site. **Figure 4** illustrates a wireless multimedia receiver/server device **480** is coupled to a local area network (LAN) **450**. The local area network (LAN) **450** may be constructed using standard Ethernet technology, Token Ring technology, homerun™ home LAN technology, or any other existing or newly created computer network technology. In a computer network based embodiment, the wireless multimedia receiver/server device **480** may serve several client systems coupled to the local area network (LAN) **450**. For example, in **Figure 4** the multimedia receiver/server device **480** may serve multimedia information to client computer systems **462**, **464**, **466**, and **468**.

Data Broadcast Receiver/Server Hardware

Figure 5 illustrates one embodiment of a multimedia receiver/server device **500**. The multimedia receiver/server device **500** receives an encoded data stream through a receiver front-end receiver system **510**. The receiver front-end system **510** includes a signal reception system **505** for receiving a digital broadcast signal and accompanying receiver circuitry for demodulating digital broadcast signal received on the signal reception system **505**. The signal reception system **505** may be a Ku band satellite antenna, a terrestrial broadcast digital television antenna, a connection to a cable television

based digital signal distribution system, or any other appropriate system for receiving broadcast signals.

A Digital Video Broadcast Satellite Based Receiver Front-End

5 The multimedia receiver/server device 500 of Figure 5 illustrates a satellite based digital video broadcast based receiver front-end system 510. In the digital video Broadcast based receiver front-end system 510, the signal reception system 505 may comprises a Ku Band satellite antenna system.

10 The Ku Band satellite signal reception system 505 includes a low-noise block converter (LNB) 507 that delivers a frequency converted signal an appropriate satellite band receiver circuitry 511. The satellite receiver circuitry 511 filters and amplifies the frequency range of the desired satellite signal. The satellite receiver circuitry 511 multiplies the filtered signal using a local oscillator
15 to recover an in-phase (I) and quadrature (Q) version of the broadcast signal.

 The satellite receiver circuitry 511 passes the in-phase (I) and quadrature (Q) signals to an analog to digital (A/D) converter 515. The analog to digital (A/D) converter 515 digitizes the in-phase (I) and quadrature (Q)
20 signals and passes the digitized signal information to transport decoder circuitry 517.

 The transport decoder circuitry 517 recovers the transmitted digital bit stream from the digitized in-phase (I) and quadrature (Q) signals. In one Ku
25 band direct video broadcast satellite embodiment, the transport decoder circuitry

517 may includes a demodulator integrated circuit such as the OTI-8511 integrated circuit from Oak Technology of Sunnyvale, California. In such a DVB satellite based system, the OTI-8511 integrated circuit demodulates the in-phase (I) and quadrature (Q) signals to recover an MPEG-2 transport stream. The MPEG-2 transport stream is defined by the ISO standard defined in the document ISO/IEC 13818-1 titled "Information technology - Generic coding of moving pictures and associated audio information: Systems." Control circuitry in the transport decoder circuitry 517 may copy the MPEG-2 transport stream into an I/O memory system 520.

A terrestrial digital television based Receiver Front-End

Figure 6a illustrates a multimedia receiver/server device 600 that has a different receiver front-end receiver system. Specifically, **Figure 6a** illustrates a multimedia receiver/server device 600 with a terrestrial digital television based receiver front-end system 610. In particular, a terrestrial digital television based upon the American Television Standards Committee (ATSC) is illustrated. In the ATSC digital television based receiver front-end system 610, the signal reception system 605 comprises an antenna system suitable for receiving ATSC digital television signals.

The ATSC digital television signals are then processed by an ATSC digital television receiver circuit 611. As in the satellite embodiment of **Figure 5**, the receiver circuit 611 is used to recover an MPEG-2 transport stream. The MPEG-2 transport stream is then decoded by transport decoder circuitry 617. Since the same transport coding is used as disclosed in the preceding receiver

system, the same MPEG-2 transport stream decoder may be used to decode the signal to retrieve the MPEG-2 transport stream. The output MPEG-2 transport stream may then be placed into the I/O memory system 520.

5 As noted in the embodiments of **Figure 5** and **Figure 6a**, multiple different types of receiver systems can be constructed that used different front-end receiver systems. In this manner, slightly modified receiver systems can be built for each target market in order to take advantage of the best broadcast medium for that market. Specifically, ATSC terrestrial digital television front-
10 end receiver systems, direct video broadcast satellite front-end receiver systems, and digital cable television front-end receiver systems can be built for ATSC terrestrial digital television markets, direct video broadcast markets, and digital cable television markets, respectively. With those three different types receiver systems, the same MPEG-2 transport systems is always used such that the same
15 MPEG-2 transport signal can be used for all the different types of markets.

A Multiple Tuner Terrestrial Digital Television Receiver Front-End

As illustrated in **Figure 2a**, it may be desirable to aggregate the extra broadcast bandwidth available from a number of digital television
20 broadcasters within a particular terrestrial broadcast television market. With such an arrangement as depicted in **Figure 2a**, the receiver systems should be able to receive all of the broadcast data signals. **Figure 6b** illustrates a multimedia receiver/server device 600 that includes multiple instances of the receiver front-end receiver system. Specifically, **Figure 6b** illustrates a
25 multimedia receiver/server device 600 with multiple instances of the receiver

circuitry 611, the Analog to Digital circuitry 615, and the transport decoder circuitry 617. In this manner, multiple data broadcasts from multiple digital television broadcasters (251, 252, and 253) can be simultaneously received. With such a multiple receiver configuration, the aggregated bandwidth may exceed multiple megabytes per second.

Receiver System Digital Information Stream Processing

Referring back to Figure 5, once the multiplexed digital stream is copied into the I/O memory system 520, the processor 540 of the receiver/server 500 performs additional processing of the digital stream. The processor 540 is part of a typical computer system arrangement that includes memory (memory 570 and I/O memory 520), long term storage 550, input/output devices (590, 541, 543, etc.), and a central processing unit (processor 540).

The processor 540 operates under the control of programs in the main memory 570. To share the computing resources of the digital receiver system 500, the processor 540 executes an operating system 571. The operating system 571 provides standard operating system features such as input/output abstraction, multitask scheduling, and memory management. The operating system allows the application software to easily access and use the resources of the computer system. In one embodiment of the present invention, the operation system 571 comprises a version of the Berkeley Standard Distribution (BSD) of the UNIX operating system. However, other operation systems can be used.

Data Broadcast Receiver/Server Hardware

As illustrated in **Figure 5**, the multimedia receiver/server **500** may execute several application programs concurrently under the control of an operating system **571** to provide data broadcasting services to a user. The software of one embodiment of a multimedia receiver/server system will be disclosed with reference to **Figures 5** and **7**. However, many different multimedia receiver/server software architectures may be created.

Referring to **Figure 7**, a conceptual software architecture diagram of a multimedia receiver/server **700** is illustrated. The software architecture has been designed to process data broadcast information received through a receiver system **701** and present that data broadcast information to a user at a client system **799**. A first step that is performed is parsing of the incoming digital information stream.

Packet Extraction and Processing

Referring the conceptual diagram of **Figure 7**, a packet extraction and processing system **710** examines the multiplexed digital information stream received by the receiver system **701**. The packet extraction and processing system **710** extracts network packets that may be of interest to the multimedia receiver/server system **700**. Specifically, the packet processing system **710** identifies and extracts packets that are specifically addressed to the multimedia receiver/server system **700** and packets that have specific defined characteristics. In a preferred embodiment, the data packets are Internet Protocol (IP) packets.

Referring back to **Figure 5**, the packet processing is performed by one or more decoding, filtering, and decrypting applications 572. In one embodiment, these applications extract IP packets from MPEG-2 transport frames. The IP packet extraction may include such steps as forward error correction, decryption, and packet reassembly. Normally, not all of the packets in the multiplexed digital information stream will be extracted since many packets may be encrypted in a manner that cannot be decrypted by this unit, addressed to other entities, or otherwise inappropriate.

Packet Routing

Referring again to **Figure 7**, the extracted packets are passed to a packet routing system 730. The packet routing system 730 routes the received packets appropriate destinations. For example, certain system update packets may be addressed for delivery to a receiver/server update application 765. The receiver/server update application 765 may thereby receive information that allows automatic software updates to be performed on the multimedia receiver/server system 700. Packets may also be routed to a management application 741 that manages the operation of the multimedia receiver/server system 700. For example, encryption keys that may be used to decrypt certain digital information streams may be delivered to the management application 741 such that the management application 741 may receive encryption keys and other control parameters.

The packet routing system 730 may route other data packets to one or more client systems coupled to the multimedia receiver/server system 700 through computer interface 790. Thus, it can be seen from Figure 7 that the multimedia receiver/server system 700 may forward data packets received from the data broadcast signal directly to client systems coupled to the multimedia receiver/server system 700. In such operations, the multimedia receiver/server system 700 acts as a packet router to deliver packets broadcast over a broadcast medium. One very useful application for this particular feature is using the multimedia receiver/server system 700 as a multicast router that can deliver multicast packets to any client or network coupled to the multimedia receiver/server system 700. For example, a stock ticker stream may be broadcast as a live multicast IP stream such that a stock trading application on client system 799 may directly receive and use real-time stock trading information.

Referring to Figure 5, the packet routing may be performed by a packet routing application 577. The routing application uses the services provided by the operating system 571 and device drivers 578 to deliver packets to the proper destinations.

Information Caching

As seen in the preceding section, the multimedia receiver/server system 700 can be used to immediately route packets received from the data broadcast signal. However, the multimedia receiver/server system 700 can also be used to provide very useful data services by locally caching information.

Referring to Figure 7, one or more caching applications 745 (data caching

application 573 in **Figure 5**) receives data packets from the packet routing system 730 and caches information from those packets into a file system 750.

In one embodiment, the caching application 745 may request to
5 receive packets addressed to one or more designated multicast addresses that carries multimedia information and accompanying descriptors. The caching application 745 selectively captures multimedia information and stores that multimedia content information 753 in a file system 750. The caching application 745 may create multimedia information directory 755 such that the cached
10 multimedia information may be quickly searched and accessed. The multimedia information may consist of anything that can be expressed in digital form including audio, video, text, web pages, and computer programs.

In one embodiment, each multimedia information stream is
15 preceded by a multimedia descriptor. The multimedia descriptor describes the details of the upcoming multimedia stream. The caching application 745 can use the multimedia descriptor to determine if the upcoming multimedia stream should be cached or not. For example, in one embodiment the user defines a set of categories that the user finds interesting. These categories are stored in users
20 preferences file 757. Then, the caching application 745 uses the multimedia descriptor information in conjunction with the set of user preferences 757 to select multimedia streams that contain news or information related to the defined set of user interests. The caching application 745 can use the multimedia descriptor to help build the multimedia directory 755.

25

The following list provides some of the information that may be provided in a multimedia descriptor:

Title: A title for the multimedia stream

Full Headline: A news headline that can be used to describe the multimedia stream in a web page.

Origination date/time: The time the stream was broadcast.

Suggested expiration: A suggested expiration time for the stream. A multimedia receiver/server may use the expiration time to determine when the stream should be deleted from the multimedia content cache 753.

Source: A source of the multimedia stream (Reuters, CNN, Associated Press, United Press International, etc.)

Multimedia Stream Format: Information that describes the protocol and format of the multimedia information stream.

Accompanying multimedia stream(s): Other related multimedia streams.

SDP descriptor: A session description protocol (SDP) as defined by the IETF RFC 2327 for the multimedia stream.

Importance: A relative importance value assigned to the multimedia stream. The Importance value may be used when created user displays such that highly important stories are listed first.

Categorization code: A detailed categorization value that defines the subject matter of the multimedia stream. The categorization code may be hierarchical. For example, a multimedia video clip about the Minnesota Vikings winning the Superbowl may be categorized as Sports/NFL/MN_Vikings

Ticker Symbols: If the multimedia story is related to one or more publicly traded corporations, the ticker symbols of those corporations should be listed here. This field can be used to identify stories about a public corporation when performing investment research.

Searching keywords: A set of keywords that are associated with the multimedia stream. The searching keywords can be used to locate relevant multimedia streams when searching the multimedia content.

News Item HTML: A preformatted web page that can be used to introduce or accompany a multimedia stream.

News Item Text: Text that describes the multimedia stream.

As can be seen from the multimedia descriptor description, the caching application 745 is provided with a large number of fields that can be used to select interesting multimedia streams. Additional fields may be used to provide additional information about the multimedia streams.

5

The caching application 745 may also handle cache clean up. Specifically, old and outdated information should be removed from the file system 750 to conserve resources. The caching application 745 may use a number of different methods of selecting information to remove. One simple method of performing cache clean up is to remove cached items after their suggested expiration time has elapsed.

10

Information Serving

The multimedia receiver/server system 700 may present the cached multimedia information in a number of different ways. However, one of the most popular current methods of presenting information is in the form of World Wide Web (WWW) pages formatted in HyperText Markup Language (HTML) or eXtensible Markup Language (XML). One embodiment of the multimedia receiver/server system 700 uses a web page constructing application 760 to create WWW pages 759 that may be presented to client systems. (The web page constructing application is listed as web page building applications 576 in Figure 5.)

15

20

25

The web page constructing application 760 may continually examine the contents of the multimedia directory 755 and the multimedia

content 753 to locate information to be incorporated into web pages. In one embodiment, the caching application 745 directly informs the web page constructing application 760 about the multimedia streams that will be cached. In this manner, the web page constructing application 760 can incorporate the newly cached information into the web pages. Furthermore, the web page constructing application 760 can incorporate "live" information that is currently being received by referring to a multicast stream that contains the live stream. Similarly, the caching application 745 should inform the web page constructing application 760 about multimedia information being removed from the file system 750 such that the web page constructing application 760 can remove references to deleted information.

The web page constructing application 760 should create web pages in accordance with the user's particular preferences. Specifically, the web page constructing application 760 refers to the user preferences file 757 to create a custom multimedia enhanced web page that specifically contains information according to the user's preferences. In a multiple client environment, the web page constructing application 760 may create a different customized web page for each user that uses the multimedia receiver/server system 700.

A web server application 781 serves the created web pages 759 to client systems that request the web pages 759. (The web server application is listed as main server application 574 on **Figure 5**.) Due to the caching of rich multimedia information, the web server 781 may be aided by one or more file streaming applications 782 and 783. The file streaming applications 782 and 783

stream rich multimedia information such as videos and audio that may be incorporated into the customized web pages 759. Furthermore, the web pages may incorporate "live" streaming information that is delivered straight from the packet routing system 730. In this manner, video from live events can be
5 incorporated directly into web pages.

Other methods of serving information besides using the World Wide Web protocols and formats may also be provided. For example, server 787 may provide raw file information to client systems the well-known Network File
10 System (NFS). Server 787 could also be a File Transport Protocol (FTP) server. Other server applications that implement other protocols can also be implemented.

15 A Data Broadcast News Application

To illustrate one type of service that may be provided by the data broadcast system of the present invention, an example of a data broadcast news application is disclosed. Referring to **Figure 7**, a user at a client system creates a
20 set of preferences that describe the user's interests. The user preferences may be obtained by presenting a set of forms to the user with web server 781. The forms can be processed by Common Gateway Interface (CGI) scripts that store the user's preferences into user preferences file 757. For example, a user may specify that he is interested in top news stories, sports information, financial
25 information, and science & technology information.

Using the user interests in the user preferences file 757, the data caching application 745 begins collecting multimedia streams and multimedia descriptors broadcast over the data broadcast system. The caching application 5 745 creates a multimedia directory 755 using multimedia descriptor information. The caching application 745 may directly inform the web page constructing application 760 about the information streams that are being cached.

The web page constructing application 760 then uses the user 10 preference information 757 along with multimedia descriptor information from the caching application 745 or from the multimedia directory 755 to create a customized multimedia enhanced web page for the user. Figure 8 illustrates one possible example of a customized new web page created for the example user that is interested in top news stories, sports information, financial information, 15 and science & technology information.

As depicted in Figure 8, the top news stories related to the user's interests are displayed in headline form. Furthermore, a multimedia video clip stream related to the most important news story within the user's interests is 20 playing within a window of the web page display. The user can control the video clip using common VideoCassette Recorder (VCR) type controls such as play, stop, fast-forward, reverse, and mute. A video window as depicted in Figure 8 may be implemented using a RealVideo viewer from RealNetworks of Seattle, Washington or a NetShow viewer from Microsoft Corporation of 25 Redmond, Washington. If the user is very interested in the story playing within

the selected video clip, the user can expand the video to fill the full screen of the client system. The user may also retrieve other information related to the displayed video clip.

5 If the user is not interested in the video clip currently being displayed, the user can select one of the other headlines to bring up information on that story. The information may consist of a video clip, an audio clip, a web page, a text story, or any other digital information presentation.

10 The news web pages of the present invention can be created in typical hierarchical organization that is familiar to most computer users. **Figure 9** illustrates a conceptual diagram of a set of hierarchical web pages that have been created using the user's preferences and the available multimedia information. Thus, referring back to **Figure 8**, if the user is not interested in the
15 video clip currently being displayed or any of the current headlines, the user can select one of the different headline categories. The web server will then present a web page with specific category information.

 In one embodiment, the user can select one of the headlines in a
20 story to bring up a web page with additional stories in that category and detailed information about the selected story. For example, if the user selects the "NJ Devils trade Star Wing" headline the Sports news web page illustrated in **Figure 10** may be presented. As illustrated in **Figure 10**, a video clip of the hockey player trade is displayed. Furthermore, the web page displays sports related
25 news as a list of sports headlines. In the example of **Figure 10**, the sports

category sub-categories of NFL Headlines, NBA headlines, NHL headlines, and Other Sports Headlines are displayed.

Searching

5 The multimedia receiver/server system 700 can be used to provide custom web pages created in response to a user's query. For example, **Figure 10** illustrates a search term input box wherein a user may enter one or more search terms. More detailed searching can be performed by selecting the "search" prompt. As illustrated in **Figure 10**, a user has requested a search to be
10 performed using the term "Geocast." Referring back to **Figure 7**, the web page construction application 760 uses the entered search term to search the multimedia directory 755. Furthermore, the web page construction application 760 may examine descriptor information for multimedia streams currently being received such that "live" content may be incorporated.

15 Using the located information that is related to the search terms, the web page construction application 760 dynamically creates a web page that may be presented to the user. **Figure 11** illustrates an example of a web page that may be created after searching the multimedia directory 755 with the search
20 term "Geocast". As illustrated in **Figure 11**, the dynamically generated web page contains a list of headlines from stories or multimedia streams related to the search term. The detailed information from most important story may be presented in a separate window as illustrated in **Figure 11**. In this example, the multimedia information is a short text story with an accompanying audio stream
25 of an official company announcement. Furthermore, the web page construction

application 760 may include information from stories or multimedia information that may be related to the search terms.

In one embodiment wherein the multimedia receiver/server system 700 is coupled to the Internet, the web page construction application 760 may also include information retrieved from the Internet. Thus, the multimedia receiver/server system 700 can be used to merge multimedia information received over the data broadcast network with information retrieved from the Internet into a single display.

A Data Broadcasting Service

As disclosed, the present invention teaches methods and apparatus for implementing a broadband data broadcast system. The broadband data broadcast system allows rich multimedia information to be delivered to end-users that have narrowband or even no connection to the Internet. The broadband data broadcast system can be used to create a broadband data broadcast information service.

In one embodiment, the broadband data broadcast information service operates by selling multimedia receiver/server devices to consumers that desire service. The consumers connect their multimedia receiver/server devices to appropriate client systems such as personal computers, television set-top boxes, and home networks.

In one embodiment, a stand-alone multimedia receiver/display device may be sold such that users can use the service without having to have any other client system. Such an embodiment would be similar to the

5 embodiment of **Figure 5** except that the client interface circuitry **590** would be replaced by a display device that is capable of displaying information and the software would include client software for displaying information on the display device.

10 The broadband data broadcast service could be subscription based, advertiser supported, or a combination of paid subscription content and advertiser supported content. In a preferred embodiment, a significant amount of information is broadcast without a subscription requirement but is accompanied by advertising multimedia information that is displayed
15 concurrently or intermittently. For example, an advertisement window can be added to the screen displays of **Figures 8, 10, and 11**. Due to the broadband nature of the disclosed data broadcasting system, the advertisement window can include video and audio information. Thus, the broadband data broadcast system of the present invention permits advertisers to provide a rich multimedia
20 message to users.

The advertisements can be accompanied by additional detailed information and programs stored locally on the file system **750**. Thus, when a user is interested in a particular advertisement, the user can obtain that
25 additional information or run programs associated with the advertisement. For

example, an advertisement for a catalog based clothing merchant can be linked to a full version of the merchant's clothing catalog stored locally on the multimedia receiver/server device 700. Advertisers that desire to have large commercial documents such as product catalogs stored within the cache of the multimedia receiver/server systems could be charged a fee for such a privilege. The fee may be related to the amount of time that the commercial documents will be cached in the multimedia receiver/server device 700.

The user can browse the locally stored clothing catalog and select items for purchase. If the user has an Internet connection, the user can fill out an order form to order an item from the catalog. The broadband data broadcast capability of the present invention allows the catalog to include far more detailed information than normally presented on an Internet web page. Furthermore, the caching capability of the system allows all the catalog information to be stored locally for immediate and instantaneous access. Thus, it can be seen that the data broadcast service of the present invention provides the rich multimedia experience of radio and television along with the interactive browsing features of the Internet.

As depicted in **Figures 3a** and **3b**, not all users of the multimedia receiver/server system of the present invention will have an Internet "back channel." Thus, a user without an Internet connection that browses a product catalog contained within the multimedia receiver/server system cannot initiate an Internet based ecommerce transaction. For such users, **Figure 5** illustrates one embodiment of the present invention that includes wireless network circuitry 543

for providing a wireless back channel. For example, a contract may be made with a cellular telephone provider to obtain access to the Short Messaging Service (SMS) portion of their cellular telephone network. The wireless network circuitry 543 may provide significant bandwidth to enable complex transactions such as online gaming, however the wireless network circuitry 543 need only provide a narrowband connection for ecommerce applications such as purchase orders.

In addition to advertiser supported content, a number of subscription fee based premium services can be offered using the directed broadcast system of the present invention. For example, a special financial information subscription package may be offered that contains real-time stock quotes and in-depth financial news. Such subscription fee based premium data broadcast services would be protected by encrypting the digital information streams containing the premium content. To prevent piracy, the encryption system can be aided with the use of tamper-proof encryption circuitry 545 as depicted in Figure 5. The tamper-proof encryption circuitry 545 contains private keys that cannot be accessed. Attempts to access the secret encryption keys within the encryption circuitry 545 will destroy the encryption circuitry 545. In one embodiment, the secure encryption module 870 comprises an iButton from Dallas Semiconductor of Dallas, Texas.

The foregoing has described a directed data broadcast system. It is contemplated that changes and modifications may be made by one of ordinary

CLAIMS

We claim:

1 1. A multimedia receiver apparatus, said apparatus
2 comprising:
3 a wireless receiver circuit, said wireless receiver demodulating a wireless
4 encoded digital multimedia signal having a plurality of multimedia
5 streams;
6 a processor, said processor selecting and extracting a subset of multimedia
7 streams of said plurality of multimedia streams;
8 a long term storage device, said processor caching a subset of information
9 from said subset of multimedia streams into said long term storage
10 device; and
11 a computer network interface, said computer network interface for
12 selectively outputting information from said subset of multimedia
13 streams.

1 2. The apparatus of claim 1 wherein said wireless encoded
2 digital multimedia signal comprises a satellite broadcast signal.

1 3. The apparatus of claim 1 wherein said wireless encoded
2 digital multimedia signal comprises a terrestrial digital television broadcast
3 signal.

1 4. The apparatus of claim 1 wherein each multimedia stream
2 comprises Internet Protocol packets.

1 5. The method of claim 1 wherein said wireless encoded digital
2 multimedia signal comprises MPEG-2 transport protocol.

1 6. The apparatus of claim 5 wherein each multimedia stream
2 comprises Internet Protocol packets encapsulated within said MPEG-2 transport
3 protocol.

1 7. The apparatus of claim 1 wherein said wireless receiver
2 circuit comprises an ATSC digital television receiver circuit.

1 8. The apparatus of claim 1 wherein said wireless receiver
2 circuit comprises an ATSC digital television receiver circuit.

1 9. The apparatus of claim 1 wherein said wireless receiver
2 circuit comprises a direct video broad satellite receiver circuit.

1 10. The apparatus of claim 1 wherein said wireless receiver
2 circuit comprises a digital cable television receiver circuit.

1 11. The apparatus of claim 1 wherein said processor outputs
2 information from said subset of multimedia streams in a World Wide Web
3 format.

1 12. A method of generating revenue, said method comprising:
2 distributing a plurality of data broadcast receiver systems, said data
3 broadcast receiver systems comprising
4 receiver circuitry for demodulating and decoding an encoded
5 digital information signal,
6 cache for storing multimedia information from said encoded digital
7 information signal, and
8 interface circuitry for coupling a receiver system to a client system
9 to output said multimedia information to said client system ;
10 receiving a broadcast and retention fee from an entity desiring to
11 distribute designated digital information; and

12 broadcasting designated digital information to said data broadcast
13 receiver systems; and
14 caching said designated digital information in said data broadcast receiver
15 systems such that client systems coupled to said data broadcast
16 receiver systems may retrieve said designated digital information.

1 13. The method of claim 12 wherein said entity pays a fee
2 related to an amount of time that said designated digital information will be
3 cached in said broadcast receiver systems.

1 14. The method of claim 12 wherein said entity pays a fee
2 related to an amount of said designated digital information.

1 15. A method of distributing data, said method comprising:
2 broadcasting a plurality of popular multimedia streams across a broadcast
3 medium;
4 receiving said plurality of popular multimedia streams in data broadcast
5 receiver system;
6 caching a subset of said popular multimedia streams in a cache in said
7 data broadcast receiver system;
8 coupling said data broadcast receiver system to a wired network;

9 receiving data information from said wired network into said data
10 broadcast receiver system; and
11 presenting a unified data service to a client computer system coupled to
12 said data broadcast receiver system that comprises said subset of said
13 popular multimedia streams cached on said receiver system and said
14 data information retrieved from said wired network.

1 16. The method of distributing data as claimed in claim 15
2 wherein said wired network comprises the Internet.

1 17. The method of distributing data as claimed in claim 15
2 wherein said data information from said wired network comprises information
3 from an Internet portal site.

1 18. The method of distributing data as claimed in claim 15
2 further comprising:
3 receiving in data broadcast receiver system a query from said client
4 system;
5 searching said cache for matching multimedia streams that match said
6 query;
7 searching a server system coupled to said wired network for matching
8 data information that matches said query; and

9 presenting a query response from said data broadcast receiver system to
10 said client system that comprises said matching multimedia streams
11 and matching data information.

1 19. The method of claim 15 further comprising:
2 encrypting each digital information stream.

1 20. A data broadcast system, said data broadcast system
2 comprising:
3 An MPEG-2 transport stream based data broadcast control center, said
4 MPEG-2 transport stream based data broadcast control center creating
5 a MPEG-2 transport stream based data broadcast stream;
6 Digital cable television based data broadcast receiver for receiving said
7 MPEG-2 transport stream in digital cable television markets; and
8 An ATSC terrestrial digital television broadcast based data broadcast
9 receiver for receiving said MPEG-2 transport stream in ATSC
10 terrestrial digital television broadcast markets.

ABSTRACT OF THE DISCLOSURE

A broadband data broadcast system that allows rich multimedia content to be delivered to a plurality of subscribers is disclosed. The broadband data broadcast system operates by multiplexing a plurality of rich multimedia digital information streams together at a centralized data broadcast center. The data broadcast center then broadcasts the multiplexed digital information stream on a broadcast medium such as satellite broadcasts, radio frequency broadcasts, or digital television broadcasts. A large number of receiver systems receive the broadcast signal and demodulate the broadcast signal to retrieve the multiplexed digital stream. The receiver system extracts a subset of digital information streams that the particular receiver system's owner has designated are of interest. The receiver system caches the interesting digital information stream for later access. The receiver system outputs the interesting digital information streams to a client system upon demand. The receiver system may also stream an incoming digital information stream to a client as the stream is received.

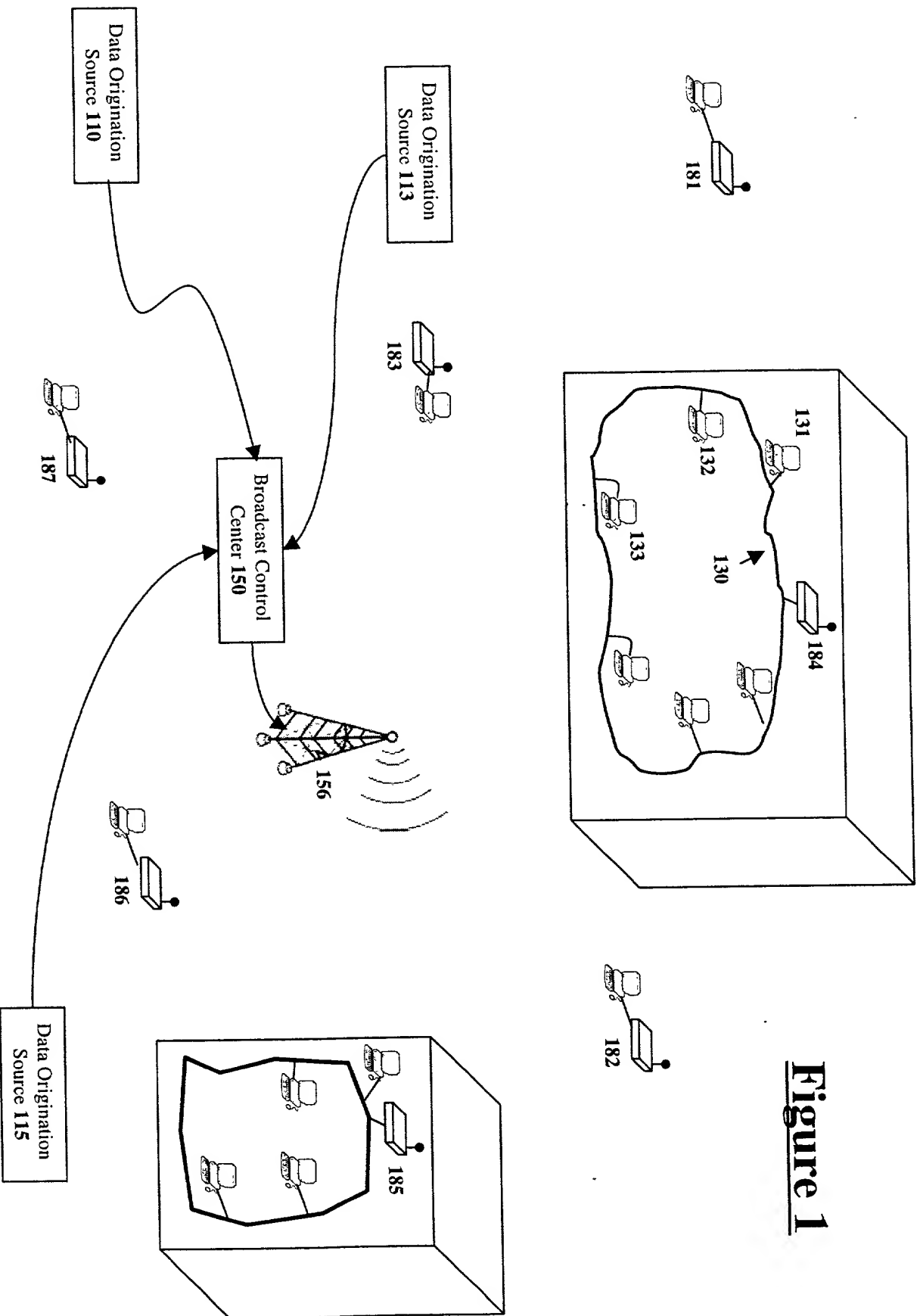
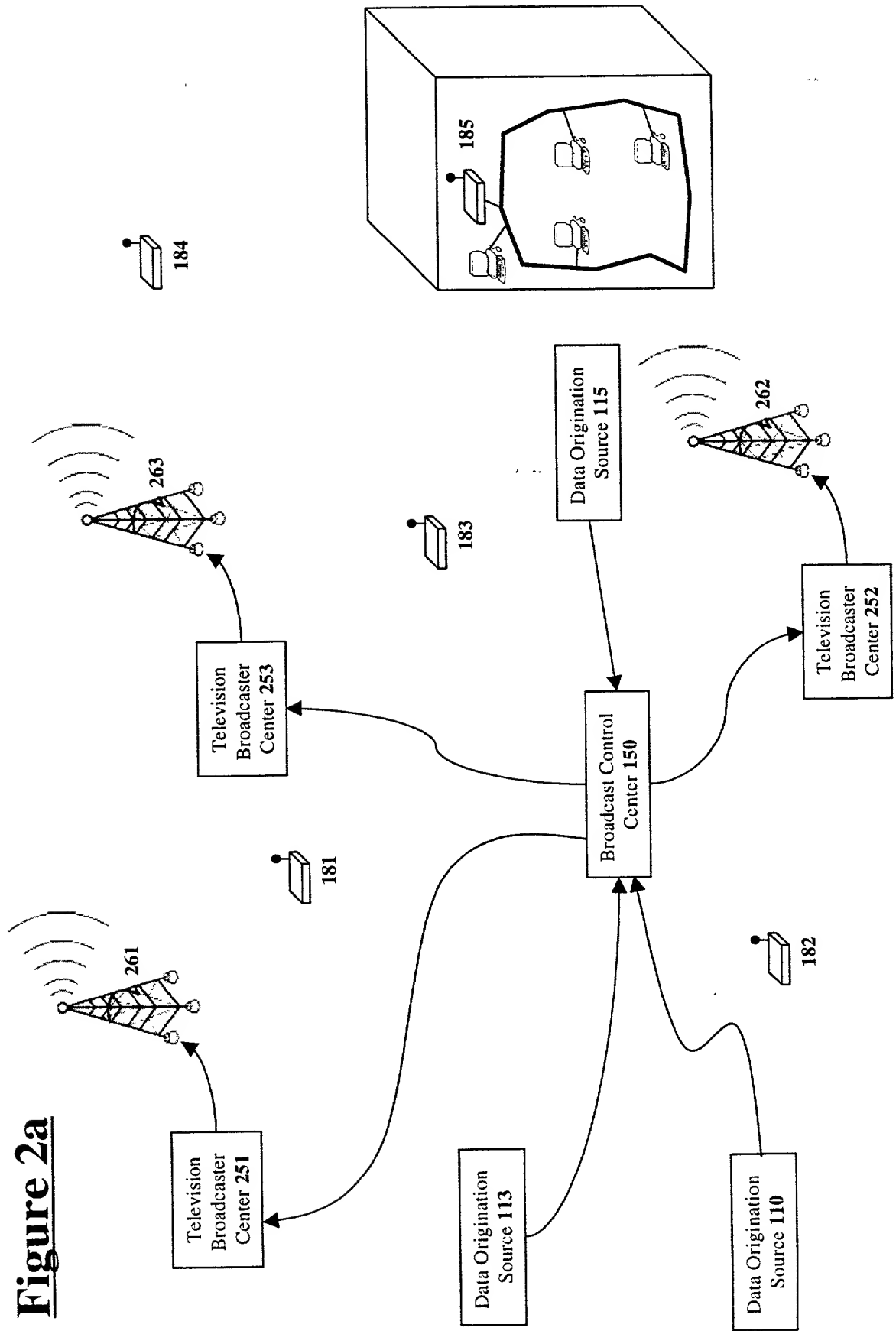


Figure 1

Figure 2a



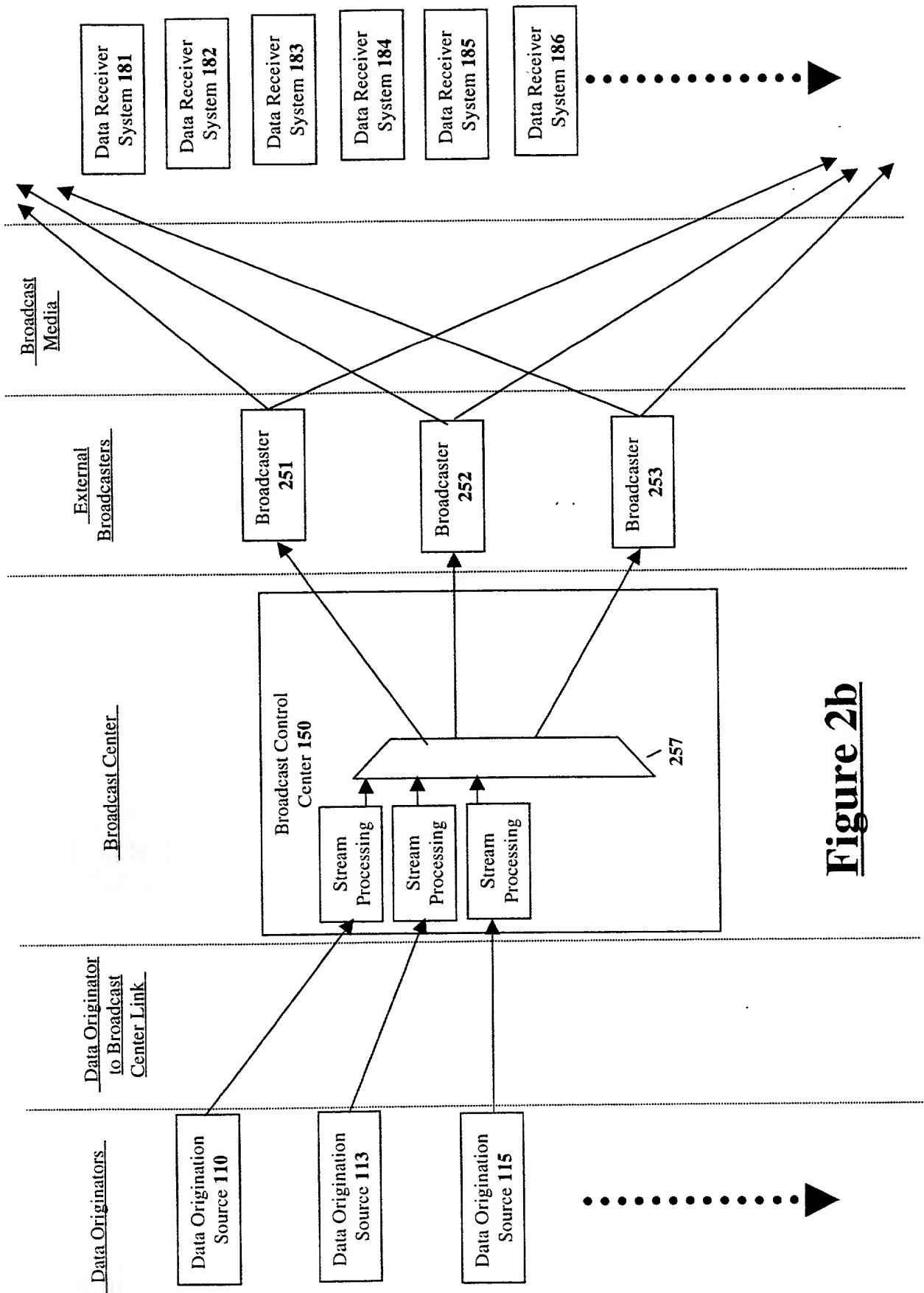


Figure 2b

Figure 3a

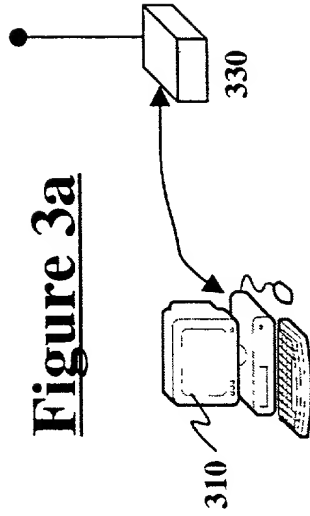


Figure 3c

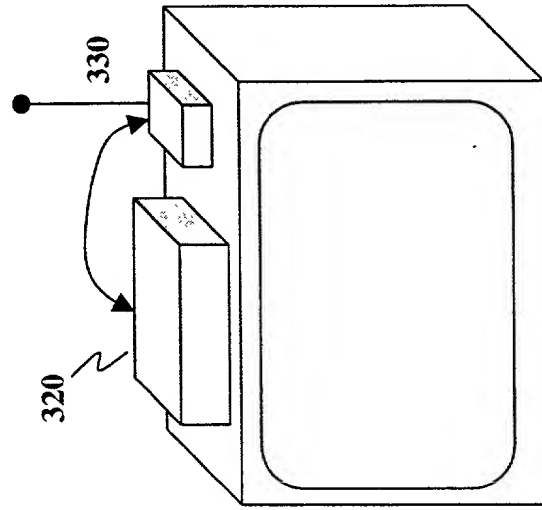
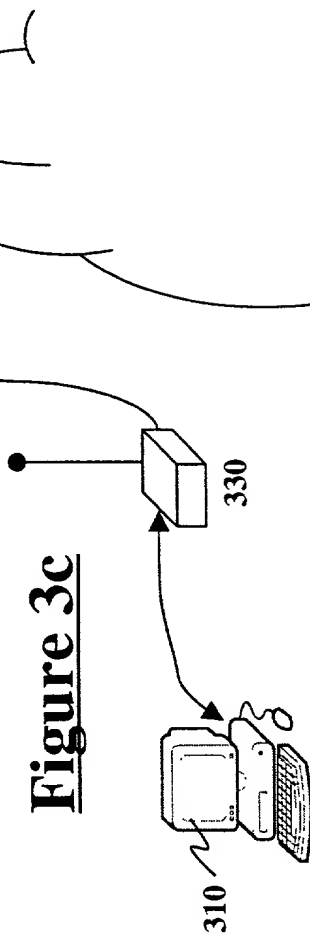


Figure 3b

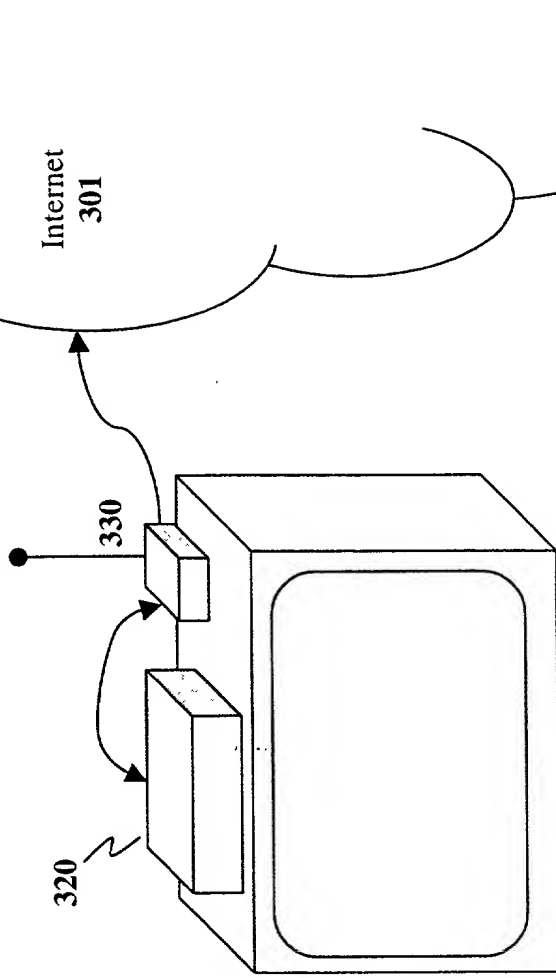


Figure 3d

Figure 4

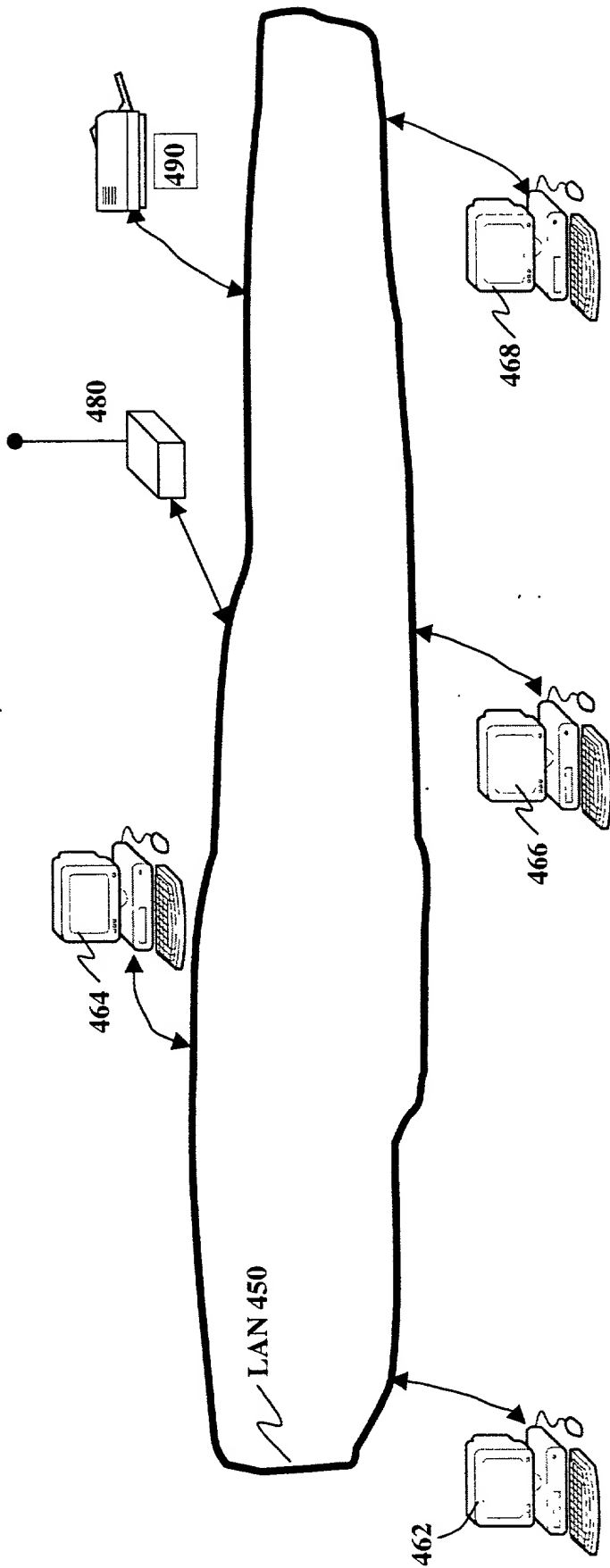
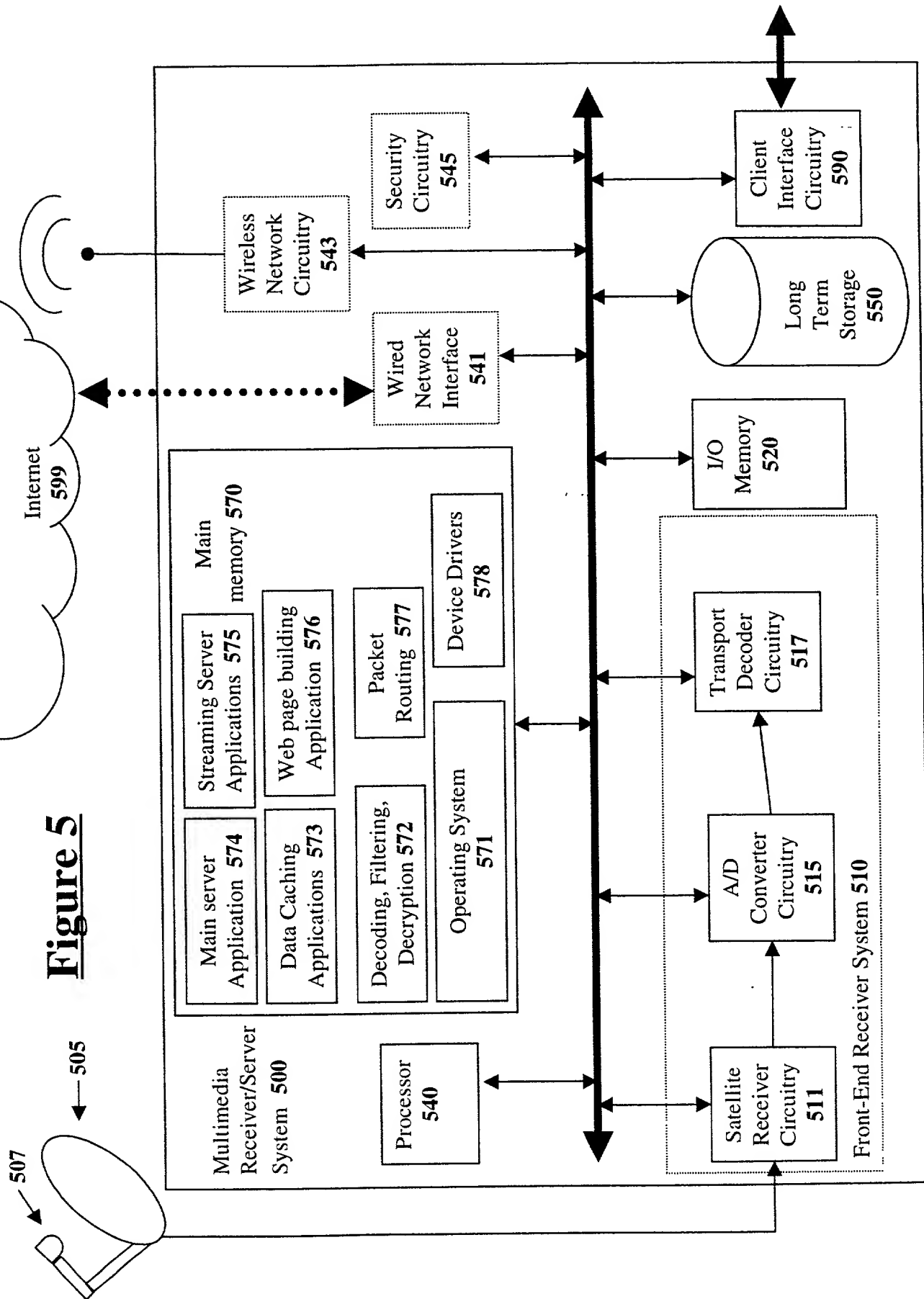


Figure 5



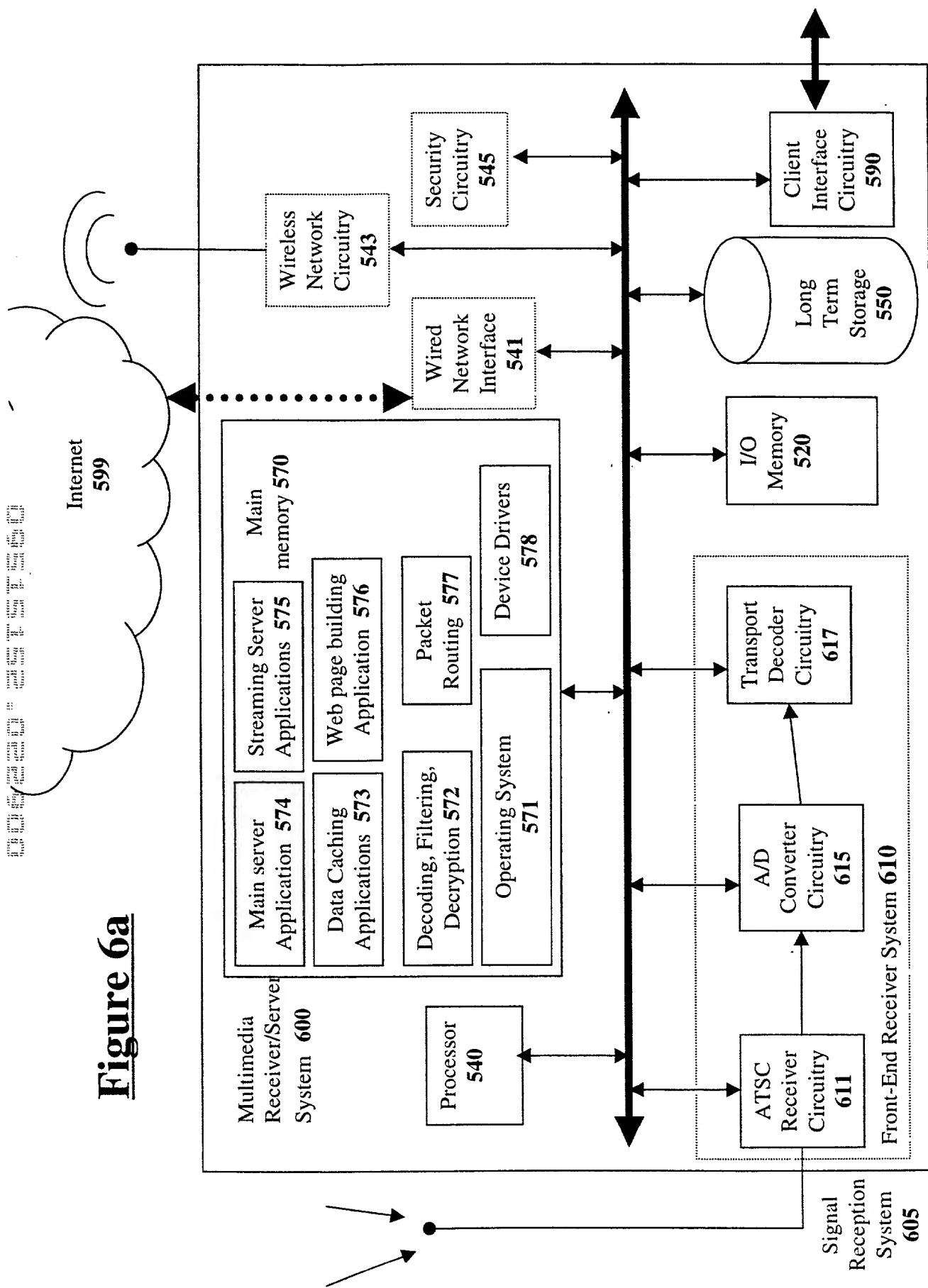


FIG. 6b is a block diagram of a multimedia receiver/server system 601 in accordance with the present invention. The system 601 is connected to an Internet 599 via a wired network interface 541 and a wireless network circuitry 543. The system 601 includes a processor 540, a main server application 574, data caching applications 573, streaming server applications 575, web page building applications 576, packet routing 577, decoding and filtering/decryption 572, an operating system 571, device drivers 578, and main memory 570. The system 601 also includes a front-end receiver system 630 with a signal reception system 605, receiver circuitry 631, A/D converter circuitry 635, and transport decoder circuitry 637. The system 601 is further connected to a client interface circuitry 590 and long term storage 550 via an I/O memory 520.

Figure 6b

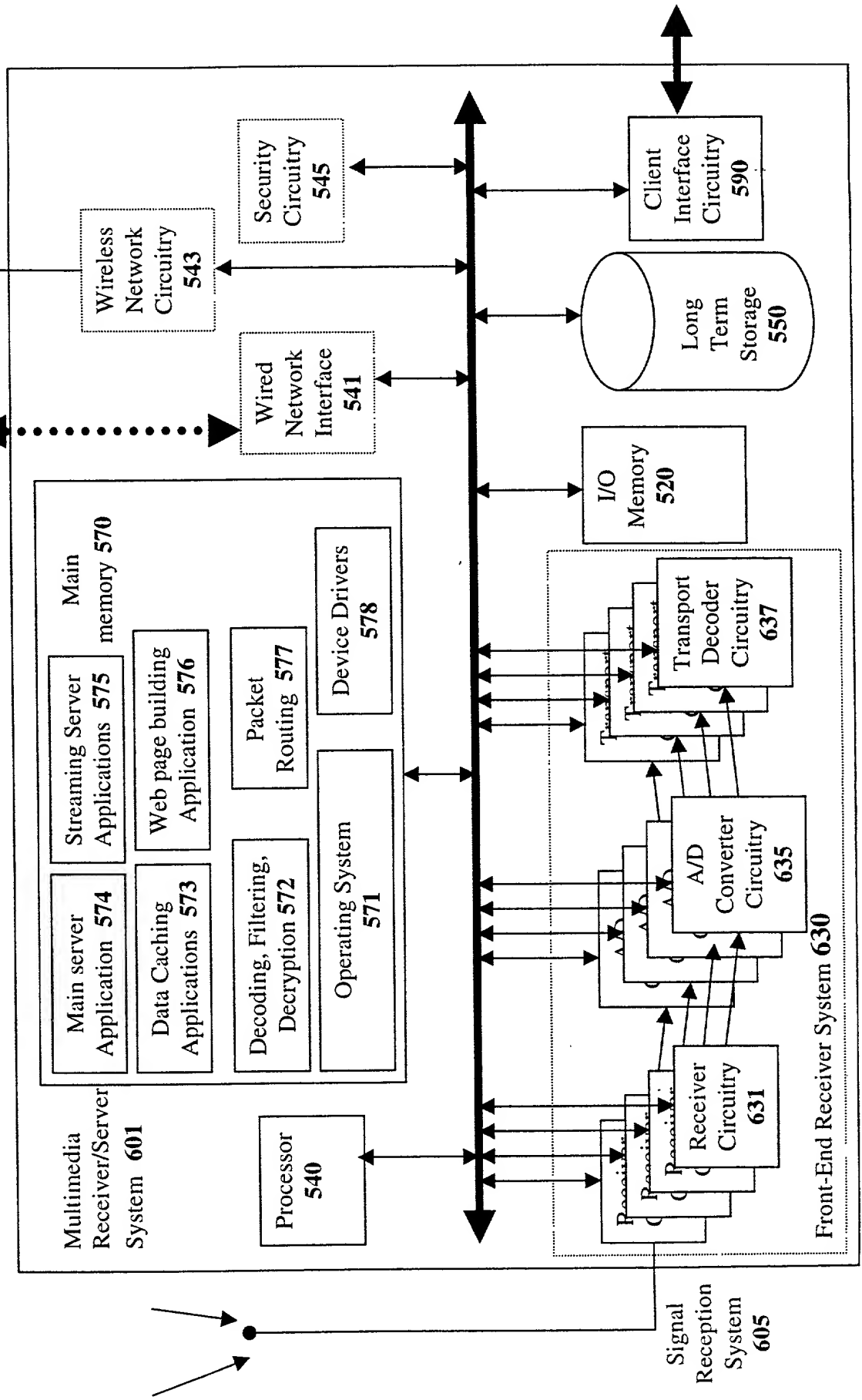
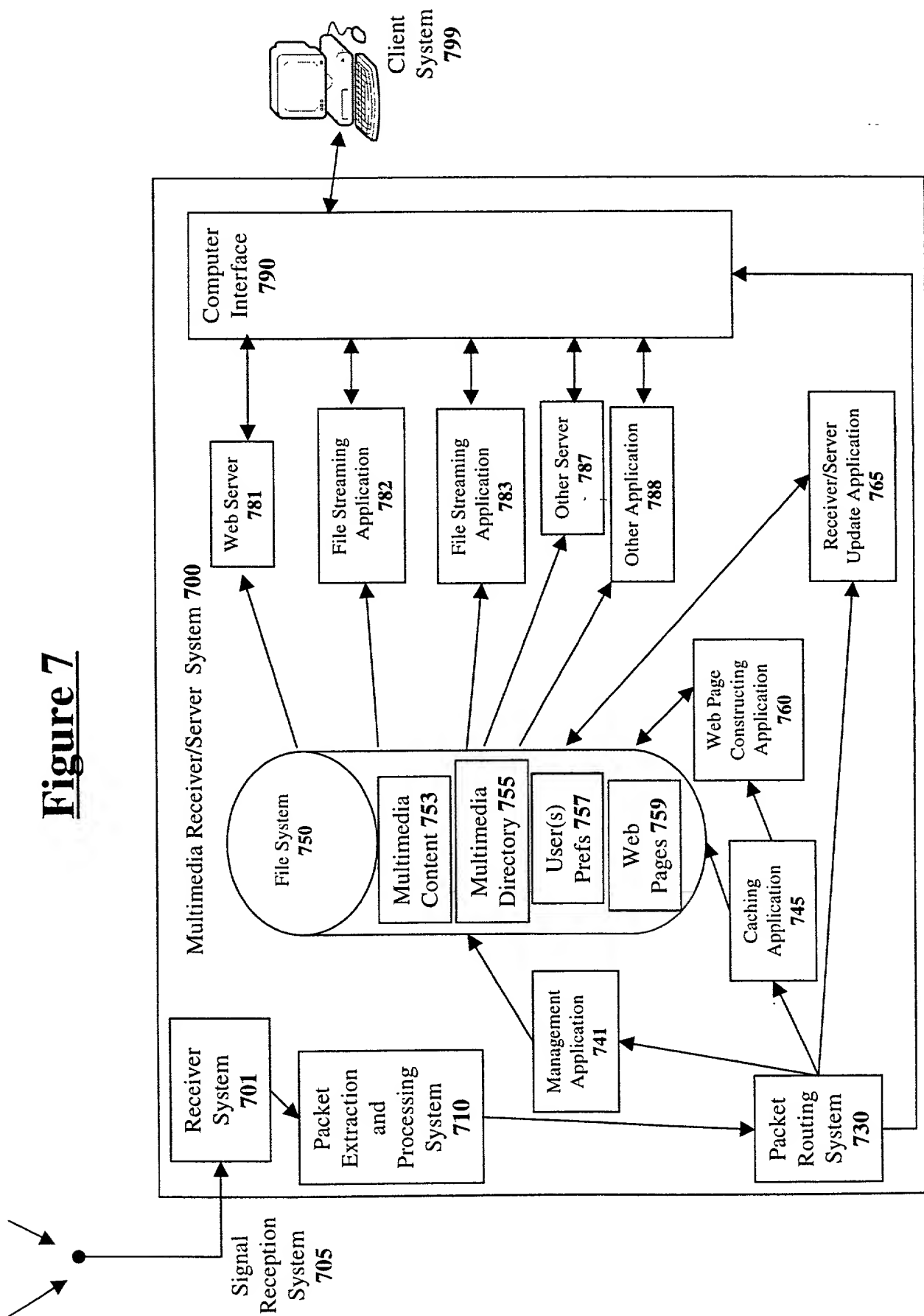


Figure 7



[illegible]

News Headlines

- Serbia Leaves Kosovo
- Manned Mars Mission Launch
- MN Vikings win Superbowl!
- Ice Storm Cripples East Coast
- Dow hits 20,000
- Bill Gates Donates 5 billion

Sports Headlines

- MN Vikings defeat 49ers
- NJ Devils trade star wing
- 2008 Olympics in Beijing
- Michael Jordan Coaches Lakers
- Mexico team joins MLB

Financial Headlines

- Dow hits 20,000
- Microsoft releases Office for Linux
- GM and Toyota Merge
- AOL and Geocast form joint venture
- Tech stocks gain

Local Information

News Weather Traffic Sports Entertainment

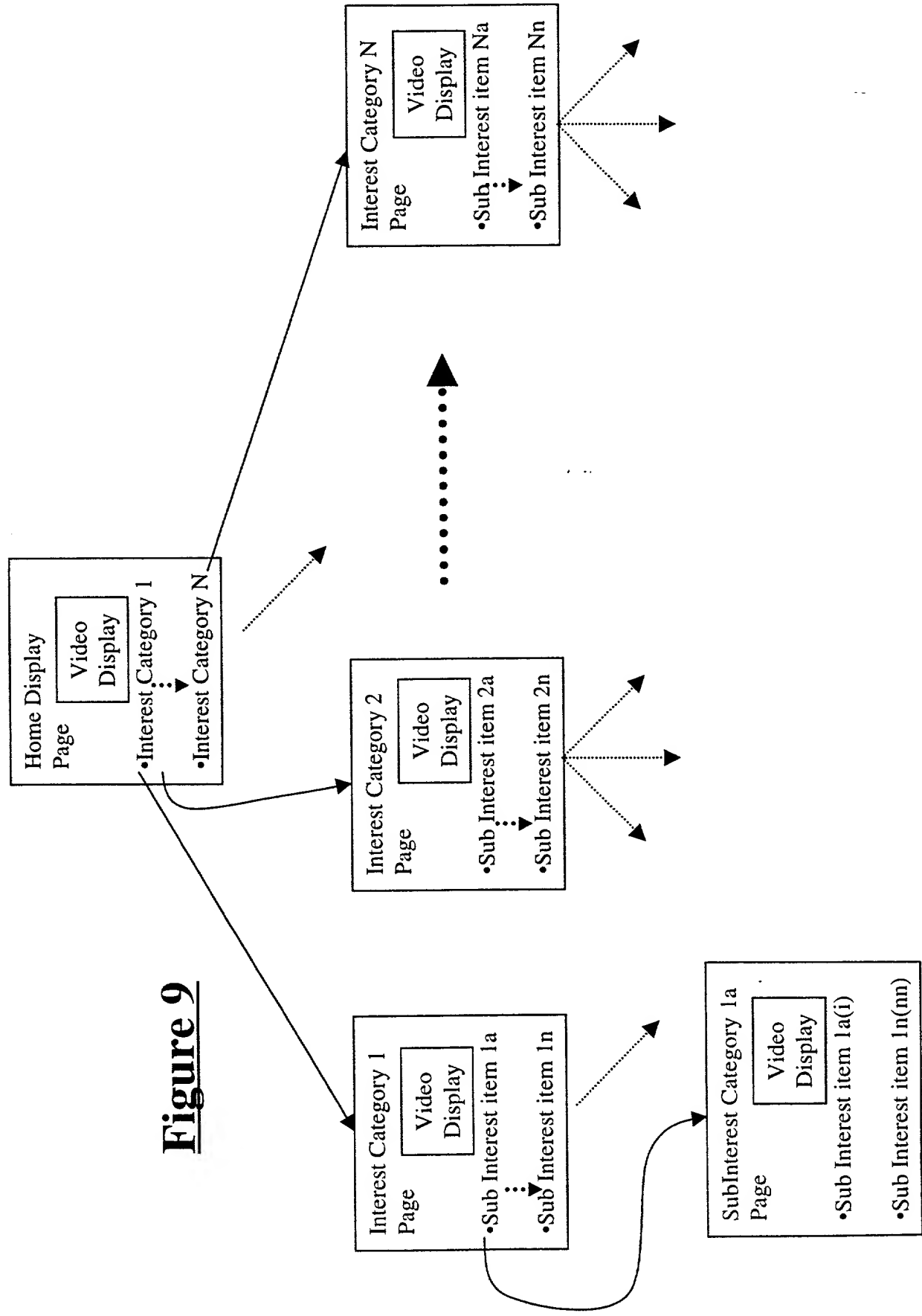
Fullscreen



Science and Technology

- Manned Mars Mission Launch
- International Mars Mission Crew
- Human Genome project complete
- Music ROM format released
- Solar Storm disrupts satellites
- Voyager's last words

Search:

[illegible]

Search Result Headlines

- AOL and Geocast form joint venture
- Geocast celebrates 2 million customers
- AOL and Geocast talks rumored
- No Geocast comment on AOL talks
- Wireless fulfills broadband promises
- Geocast stock hits new high

Possible Related Headlines

- AOL joins DOW Index
- Podcast generates new strategy
- Digital Television sales soar
- E! to generate data broadcast content

Internet Headlines

- AOL and Geocast joint venture announced
- Geocast hits 2 million customer mark
- Rumor: AOL and Geocast?
- Geocast stock soars in tech stock rally



AOL/Geocast Announcement

Geocast and AOL form joint Venture - (Mountain View, California) - Geocast and on-line giant America Online (AOL) announced a joint venture to distribute rich multimedia information to AOL's customers using Geocast's Geobox wireless broadband data broadcasting service. The joint venture will allow AOL customers to enjoy rich multimedia content delivered without the delays associated with traditional computer networks. Yada yada yada yada yada . . .

Local Information

News Weather Traffic Sports Entertainment

Search:

Figure 11

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

A Broadband Data Broadcasting Service

the specification of which

XX is attached hereto.
XX was filed on April 16, 1999 as
 United States Application Number 09/293,594
 or PCT International Application Number _____
 and was amended on _____
 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s)</u>			<u>Priority Claimed</u>	
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	_____	_____
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	_____	_____
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	_____	_____

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below

_____ (Application Number)	_____ Filing Date
_____ (Application Number)	_____ Filing Date

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

_____ (Application Number)	_____ Filing Date	_____ (Status -- patented, pending, abandoned)
_____ (Application Number)	_____ Filing Date	_____ (Status -- patented, pending, abandoned)

I hereby appoint, Dag H. Johansen, Reg. No. 36,172; my patent agent, with offices located at 100 Independence Drive, Menlo Park, CA 94025, telephone (650) 566-8111, and James R. Thein, Reg. No. 31,710, my patent attorney; with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Dag H. Johansen, 100 Independence Drive, Menlo Park, CA 94025 and direct telephone calls to Dag H. Johansen, (650) 566-8111.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor Tsutomu Shimomura

Inventor's Signature  Date 24th 1999

Residence Incline Village, NV Citizenship Japan
(City, State) (Country)

Post Office Address 318 Ski Way Blvd.
Incline Village, NV 89450

Full Name of Second/Joint Inventor Steve Waltman

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Full Name of Third/Joint Inventor Mark Peting

Inventor's Signature _____ Date _____

Residence Tigard, OR Citizenship U.S.A.
(City, State) (Country)

Post Office Address 13981 SW Aerie
Tigard, OR 97224

Full Name of Fourth/Joint Inventor Castor Fu

Inventor's Signature [Signature] Date May 24, 1999

Residence Menlo Park, California Citizenship USA
(City, State) (Country)

Post Office Address 1508 San Antonio St #F, Menlo Park, CA 94025

Full Name of Fifth/Joint Inventor Dag H. Johansen

Inventor's Signature [Signature] Date 5/25/99

Residence Palo Alto, CA Citizenship U.S.A.
(City, State) (Country)

Post Office Address 335 Middlefield
Palo Alto, CA 94301

Full Name of Sixth/Joint Inventor Geoff Mulligan

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Title 37, Code of Federal Regulations, Section 1.56
Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made or record in the application, and

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
 - (2) Each attorney or agent who prepares or prosecutes the application; and
 - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

A Broadband Data Broadcasting Service

the specification of which

XX is attached hereto.
XX was filed on April 16, 1999 as
 United States Application Number 09/293,594
 or PCT International Application Number _____
 and was amended on _____
 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s)</u>			<u>Priority Claimed</u>	
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	_____	_____
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	_____	_____
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	_____	_____

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below

_____ (Application Number)	_____ Filing Date
_____ (Application Number)	_____ Filing Date

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

_____ (Application Number)	_____ Filing Date	_____ (Status -- patented, pending, abandoned)
_____ (Application Number)	_____ Filing Date	_____ (Status -- patented, pending, abandoned)

I hereby appoint, Dag H. Johansen, Reg. No. 36,172; my patent agent, with offices located at 100 Independence Drive, Menlo Park, CA 94025, telephone (650) 566-8111, and James R. Thein, Reg. No. 31,710, my patent attorney; with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Dag H. Johansen, 100 Independence Drive, Menlo Park, CA 94025 and direct telephone calls to Dag H. Johansen, (650) 566-8111.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor Tsutomu Shimomura

Inventor's Signature _____ Date _____

Residence Incline Village, NV Citizenship Japan
(City, State) (Country)

Post Office Address 318 Ski Way Blvd.
Incline Village, NV 89450

Full Name of Second/Joint Inventor Steve Waltman

Inventor's Signature [Signature] Date 22 June 77

Residence Boulder, CO Citizenship U.S.A.
(City, State) (Country)

Post Office Address 1441 County Rd 83
Boulder, CO 80302

Full Name of Third/Joint Inventor Mark Peting

Inventor's Signature _____ Date _____

Residence Tigard, OR Citizenship U.S.A.
(City, State) (Country)

Post Office Address 13981 SW Aerie
Tigard, OR 97224

Full Name of Fourth/Joint Inventor Castor Fu

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Full Name of Fifth/Joint Inventor Dag H. Johansen

Inventor's Signature _____ Date _____

Residence Palo Alto, CA Citizenship U.S.A.
(City, State) (Country)

Post Office Address 335 Middlefield
Palo Alto, CA 94301

Full Name of Sixth/Joint Inventor Geoff Mulligan

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Title 37, Code of Federal Regulations, Section 1.56
Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclosure information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
- (2) Each attorney or agent who prepares or prosecutes the application; and
- (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

A Broadband Data Broadcasting Service

the specification of which

XX is attached hereto.
XX was filed on April 16, 1999 as
 United States Application Number 09/293,594
 or PCT International Application Number _____
 and was amended on _____
 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s)</u>			<u>Priority Claimed</u>	
<u>(Number)</u>	<u>(Country)</u>	<u>(Day/Month/Year Filed)</u>	<u>Yes</u>	<u>No</u>
<u>(Number)</u>	<u>(Country)</u>	<u>(Day/Month/Year Filed)</u>	<u>Yes</u>	<u>No</u>
<u>(Number)</u>	<u>(Country)</u>	<u>(Day/Month/Year Filed)</u>	<u>Yes</u>	<u>No</u>
<u>(Number)</u>	<u>(Country)</u>	<u>(Day/Month/Year Filed)</u>	<u>Yes</u>	<u>No</u>

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below

(Application Number)

Filing Date

(Application Number)

Filing Date

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Number)

Filing Date

(Status -- patented,
pending, abandoned)

(Application Number)

Filing Date

(Status -- patented,
pending, abandoned)

I hereby appoint, Dag H. Johansen, Reg. No. 36,172; my patent agent, with offices located at 100 Independence Drive, Menlo Park, CA 94025, telephone (650) 566-8111, and James R. Thein, Reg. No. 31,710, my patent attorney; with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Dag H. Johansen, 100 Independence Drive, Menlo Park, CA 94025 and direct telephone calls to Dag H. Johansen, (650) 566-8111.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor Tsutomu Shimomura

Inventor's Signature _____ Date _____

Residence Incline Village, NV Citizenship Japan
(City, State) (Country)

Post Office Address 318 Ski Way Blvd.
Incline Village, NV 89450

Full Name of Second/Joint Inventor Steve Waltman

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Full Name of Third/Joint Inventor Mark Peting

Inventor's Signature  Date 5-26-1999

Residence Tigard, OR Citizenship U.S.A.
(City, State) (Country)

Post Office Address 13981 SW Aerie
Tigard, OR 97224

Full Name of Fourth/Joint Inventor Castor Fu

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Full Name of Fifth/Joint Inventor Dag H. Johansen

Inventor's Signature _____ Date _____

Residence Palo Alto, CA Citizenship U.S.A.
(City, State) (Country)

Post Office Address 335 Middlefield
Palo Alto, CA 94301

Full Name of Sixth/Joint Inventor Geoff Mulligan

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Title 37, Code of Federal Regulations, Section 1.56
Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and
 - (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.
- (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and
- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
 - (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
 - (2) Each attorney or agent who prepares or prosecutes the application; and
 - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

A Broadband Data Broadcasting Service

the specification of which

XX is attached hereto.
XX was filed on April 16, 1999 as
 United States Application Number 09/293,594
 or PCT International Application Number _____
 and was amended on _____
 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s)</u>			<u>Priority Claimed</u>	
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	Yes	No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	Yes	No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below

_____ (Application Number)	_____ Filing Date
_____ (Application Number)	_____ Filing Date

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

_____ (Application Number)	_____ Filing Date	_____ (Status -- patented, pending, abandoned)
_____ (Application Number)	_____ Filing Date	_____ (Status -- patented, pending, abandoned)

I hereby appoint, Dag H. Johansen, Reg. No. 36,172; my patent agent, with offices located at 100 Independence Drive, Menlo Park, CA 94025, telephone (650) 566-8111, and James R. Thein, Reg. No. 31,710, my patent attorney; with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Dag H. Johansen, 100 Independence Drive, Menlo Park, CA 94025 and direct telephone calls to Dag H. Johansen, (650) 566-8111.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor Tsutomu Shimomura

Inventor's Signature _____ Date _____

Residence Incline Village, NV Citizenship Japan
(City, State) (Country)

Post Office Address 318 Ski Way Blvd.
Incline Village, NV 89450

Full Name of Second/Joint Inventor Steve Waltman

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Full Name of Third/Joint Inventor Mark Peting

Inventor's Signature _____ Date _____

Residence Tigard, OR Citizenship U.S.A.
(City, State) (Country)

Post Office Address 13981 SW Aerie
Tigard, OR 97224

Full Name of Fourth/Joint Inventor Castor Fu

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

Full Name of Fifth/Joint Inventor Dag H. Johansen

Inventor's Signature _____ Date _____

Residence Palo Alto, CA Citizenship U.S.A.
(City, State) (Country)

Post Office Address 335 Middlefield
Palo Alto, CA 94301

Full Name of Sixth/Joint Inventor Geoff Mulligan

Inventor's Signature Geoff Mulligan Date 6/25/99

Residence Co Springs CO Citizenship USA
(City, State) (Country)

Post Office Address 2175 Cloverdale Dr
Co Springs CO 80520

Title 37, Code of Federal Regulations, Section 1.56
Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and
 - (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.
- (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and
- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
 - (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
 - (2) Each attorney or agent who prepares or prosecutes the application; and
 - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.